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NEW SERIES, NO. 23

A Catalogue of Type Specimens of Fossil Fishes in the Field Museum of Natural History

John Clay Bruner

January 31, 1992
Publication 1431

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Croat, T. B. 1978. Flora of Barro Colorado Island. Stanford University Press, Stanford, Calif., 943 pp.

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Langdon, E. J. M. 1979. Yage among the Siona: Cultural patterns in visions, pp. 63-80. *In* Browman, D. L.,and R. A. Schwarz, eds., Spirits, Shamans, and Stars. Mouton Publishers, The Hague, Netherlands.

Murra, J. 1946. The historic tribes of Ecuador, pp. 785-821. In Steward, J. H., ed., Handbook of South American Indians. Vol. 2, The Andean Civilizations. Bulletin 143, Bureau of American Ethnology, Smithsonian Institution, Washington, D.C.

Stolze, R. G. 1981. Ferns and fern allies of Guatemala. Part II. Polypodiaceae. Fieldiana: Botany, n.s., **6:** 1-522.

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This paper is dedicated to
Dr. Mark V. H. Wilson
in honor of his pioneer work
on the Mesozoic and Cenozoic fishes
of the Northwestern United States
and Western Canada

FIELDIANA

Geology

NEW SERIES, NO. 23

A Catalogue of Type Specimens of Fossil Fishes in the Field Museum of Natural History

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A Catalogue of Type Specimens of Fossil Fishes in the Field Museum of Natural History

John Clay Bruner

Abstract

A complete list of the fossil types of fishes deposited in the collections of the Field Museum of Natural History is provided. These collections represent 119 holotypes, 36 cotypes, 1,503 paratypes, 37 casts of holotypes, and 2 casts of paratypes. The catalogue number, the latest classification, a short description of the material, the type locality, the full citation, the pages on which it was described, and listings of any figures are provided for each type specimen.

Introduction

This type catalogue represents the first time the Field Museum of Natural History has had a complete listing of the fossil fishes deposited in the Geology Department. The museum had no accurate idea of how many types were in these collections. In some cases, specimen lots were never marked as type specimens; in other cases, specimens marked as types were never published. This list corrects mistakes made by the original authors in citing the type specimens. Some authors used the wrong prefixes to the catalogue number or quoted the wrong specimen number. It is hoped this type catalogue will lead to the discovery of more fossil type specimens deposited at the Field Museum that are yet unidentified.

Another purpose of this catalogue is to advertise the final resting place of the types. The collections of the Walker Museum of the University of Chicago now belong to the Field Museum, where they are deposited. Yet the University of Chicago still receives letters requesting specimens from the Walker Museum in spite of a previous notice (Weller, 1964). There are a few other types deposited at the Field Museum that once belonged to other universities (for example, the University of Minnesota [Grande, 1991]). I have also included a listing of casts of type specimens from other museums in the collections. Often a cast can be as useful as the original specimen. Normally workers would not think of checking for copies of types at a museum other than the one at which the original is deposited. And, prior to this catalogue, no list of casts of type specimens from other museums in the collections of the Geology Department had ever been prepared. Some museums will not loan their type specimens. This list may be useful to those workers who need to see a specimen but may not be able to travel to the museum where the original is deposited.

This catalogue provides the latest classifications if the original classification of the type is not considered by the author to be valid. The classification scheme followed for the fishes is a combination of Carroll (1988), Denison (1978, 1979), Moy-Thomas and Miles (1971), Nelson (1984), Obruchev (1967), and Zangerl (1981). This listing gives the catalogue number (in some cases, multiple numbers have been assigned to the same lot), a brief description of the specimen, and the geologic age and the type locality for the holotype and cotype. The names of the collectors are given if known. The complete literature citation for each type is given, as are the pages on which it was described and any figures of the specimens. Also, all paratype specimens are listed. When citing fossil fishes in the collections of the Field Museum, the full catalogue number and both prefixes should be used. The prefixes used in this catalogue are as follows.

FMNH Field Museum of Natural History, Geology Department, Slide Collection

P Field Museum of Natural History, Geology Department, Paleontology Collection

PE Field Museum of Natural History, Geology Department, Fossil Invertebrates Collection

PF Field Museum of Natural History, Geology Department, Fossil Fishes Collection

UC University of Chicago, Walker Museum, Paleontology Collection

UF University of Chicago, Walker Museum, Fossil Fishes Collection

For example, the correct method in citing the catalogue number of the holotype of *Mayomyzon pieckoensis* Bardack and Zangerl, 1968 would be FMNH PF 5687. The abbreviation "FMNH" for Field Museum of Natural History should always come first, followed by a space, followed by the prefix of the collection (in this case, "PF"), followed by a space, followed by the catalogue number.

The fossil fish type collection consists of 119 holotypes, 35 cotypes, 1,503 paratypes, 36 casts of holotypes, and 2 casts of paratypes. Seventy-seven holotypes and 1,447 paratypes are part of the original Field Museum collections. Forty-two holotypes, 32 cotypes, and 56 paratypes were once part of the collections of the old Walker Museum of the University of Chicago. The most prolific author of fossil fishes in the Field Museum's holdings is the former curator of fossil fishes, the late Robert H. Denison. In a series of papers (1950, 1951, 1952, 1953, 1955, 1958, 1960, 1964, 1966, 1967, 1968a, 1968b, 1969, 1970), he described 31 holotypes and 931 paratypes. Rainer Zangerl (1966, 1969, 1973, 1979, 1981) described 16 holotypes and 28 paratypes, Rainer Zangerl and Gerard R. Case (1973) 7 holotypes and 224 paratypes, Orestes H. St. John and Amos H. Worthen (1875, 1883) 14 holotypes and 24 cotypes, Edward Drinker Cope (1875, 1877a, b, 1883, 1893, 1894) 11 holotypes, Shelton P. Applegate (1970) 5 holotypes and 7 paratypes, John Strong Newberry (1897) 4 holotypes and 5 cotypes, John Strong Newberry and Amos H. Worthen (1866, 1870) 3 holotypes, Charles Rochester Eastman (1899, 1908) 1 holotype and 4 cotypes, E. B. Branson (1905) 3 holotypes and 1 cotype, Michael Eugene Williams (1985) 3 holotypes and 224 paratypes, Alfred Sherwood Romer and Homer S. Smith (1934) 2 holotypes and 1 paratype, Alfred Sherwood Romer and F. M. Fryxell (1928) 1 holotype, David Bardack (1974) 1 holotype and 5 paratypes, David Bardack and Eugene S. Richardson, Jr. (1977) 2 holotypes and 6 paratypes, David Bardack and Rainer Zangerl (1968) 1 holotype and 2 paratypes, Chalmer L. Cooper (1936) 2 holotypes and 9 paratypes, Hans-Peter Schultze (1977) 5 paratypes, Hans-Peter Schultze and David Bardack (1987) 3 holotypes and 7 paratypes, and Lance Grande (1979, 1988) 2 holotypes. The following authors are responsible for one holotype each in the Field Museum's collections: Stuart Weller (1906); Sharat Kumar Roy (1929); Alfred Sherwood Romer and F. M. Fryxell (1928); Everett Claire Olson (1951), 1 holotype and 38 paratypes; Eleanor Daly (1973), 1 holotype and 6 paratypes; and, Louis Hussakof (1947), 1 holotype and 1 paratype. The following authors are responsible for describing paratypes residing in our collections: Lance Grande, Joseph T. Eastman, and Ted M. Cavender (1982), 7 paratypes; A. Heintz (1929), 1 paratype.

Acknowledgments

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Superclass AGNATHA

Class CEPHALASPIDOMORPHI
Order PETROMYZONTIFORMES
Family MAYOMYZONTIDAE

Mayomyzon pieckoensis Bardack & Zangerl, 1968

PF 5687 Holotype. Whole fish, part and counterpart.

Middle Pennsylvanian: Francis Creek Shale, Essex Nodule fauna.
Illinois: Will County: Peabody Coal Company, Pit 11.
Collector: Mr. Stephen LeMay, May 27, 1967.
Bardack, David, and Rainer Zangerl. 1968. First fossil lamprey: A record from the Pennsylvanian of Illinois. Science, 162: 1265–1267. Desc. (pp. 1265–1267) & fig. Fig. 1 (p. 1265), figs. 2–4 (p. 1266).
Paratypes:
PF 5539 Specimen in counterpart. Desc. (p. 1265).
PF 5688 Specimen in counterpart. Desc. (p. 1265).

Family *Incertae sedis*

Gilpichthys greenei Bardack & Richardson, 1977
PE 18703 Holotype. Whole fish, part and counterpart.
Middle Pennsylvanian: Carbondale Fm., Westphalian D, Francis Creek Shale.
Illinois: Will or Kankakee County: Pit 11 of Peabody Coal Company.
Bardack, David, and Eugene S. Richardson, Jr. 1977. New Agnathous fishes from the Pennsylvanian of Illinois. Fieldiana: Geology, 33(26): 489–510. Desc. (pp. 497–508) & fig. Fig. 10 (p. 504).
Paratypes:
PE 23464 Part and counterpart. Desc. (pp. 497, 508) & fig. Fig. 9 (p. 502).
PF 8347 Part and counterpart. Desc. (p. 497) & fig. Fig. 11 (p. 505).
PF 8349 Part and counterpart. Desc. (p. 497).

Pipiscius zangerli Bardack & Richardson, 1977
PF 8344 Holotype. Part and counterpart.
Middle Pennsylvanian: Carbondale Fm., Westphalian D, Francis Creek Shale.
Illinois: Will County: Peabody Coal Company, Pit 11.
Bardack, David, and Eugene S. Richardson, Jr. 1977. New Agnathous fishes from the Pennsylvanian of Illinois. Fieldiana: Geology, 33(26): 489–510. Desc. (pp. 490–497) & fig. Fig. 3 (p. 493), fig. 4 (p. 494), fig. 5, (p. 495).
Paratypes:
PF 7514 Part and counterpart. Desc. (p. 492).
PF 8345 Part and counterpart. Desc. (pp. 492, 496).
PF 8346 Part and counterpart. Desc. (p. 492).

Order **CEPHALASPIDIFORMES**
Family **CEPHALASPIDIDAE** Agassiz, 1843

Cephalaspis brevirostris Denison, 1952
PF 328 Holotype. Cranial shield.
Early Devonian: Water Canyon Fm.
Utah: Cache County: About 8 mi E of Hyrum, northeast of junction of right and left branches of Blacksmith Fork, west slope of hill, NE¼, Sec. 3, T10N, R2E.
Collector: Robert H. Denison, June 1949.
Denison, Robert H. 1952. Early Devonian fishes from Utah. Part I. Osteostraci. Fieldiana: Geology, 11(6): 265–287. Desc. (pp. 277–279) & fig. Fig. 55 (p. 378), fig. 56 (p. 379).
Paratype:
PF 480 Weathered fragment of an orbit. Desc. (p. 277).

Cephalaspis novaescotiae Denison, 1955
PF 1212 Holotype. Dorsal half of the cephalic shield, exposed on the inner side, in counterpart.
Early Devonian: Lower Dittonian, Knoydart Fm., about 100 ft above bed 44 of Fletcher's section, thus presumably in his bed 53; or probably in bed 22 of the section of Leonard; about 560 ft above the lowest exposure of the Knoydart Fm.
Canada: Nova Scotia: Antigonish County: About 3 mi SW of Arisaig, a small knoll on the west side of the McAras Brook road.
Collector: Robert H. Denison, July 1952.
Denison, Robert H. 1955. Early Devonian vertebrates from the Knoydart Formation of Nova Scotia. Fieldiana: Zoology, 37: 449–464. Desc. (pp. 454–458) & fig. Fig. 111 (p. 455).
Paratypes:
PF 1213 Incomplete dorsal cephalic shield. Desc. (p. 454).
PF 1214 Incomplete dorsal cephalic shield. Desc. (p. 454).
PF 1215 Incomplete dorsal cephalic shield. Desc. (p. 454).
PF 1216 Incomplete dorsal cephalic shield. Desc. (p. 454).
PF 1217 Cornua. Desc. (p. 454).
PF 1218 Cornua. Desc. (p. 454).
PF 1219 Cornua. Desc. (p. 454).

Cephalaspis patteni Robertson, 1936
PF 422 Cast of holotype at Dartmouth College, No. 38-71-10080.

Late Devonian: Escuminac Fm.
Canada: Quebec: Miguasha, Bay of Chaleur.
Collector: William Patten, 1902–1912.
Robertson, George M. 1936. New cephalaspids from Canada. American Journal of Science, Ser. 5, 31(184): 288–295. Desc. (pp. 288–292) & fig. Fig. 1 (p. 289), fig. 2 (p. 290).

Class **PTERASPIDOMORPHI**
Subclass **HETEROSTRACI** Lankester, 1868
Order **ERIPTYCHIIDA** Ørvig, 1958
Family **ERIPTYCHIIDAE** Tarlo, 1962

Eriptychius ørvigi Denison, 1967
PF 5438b Holotype. Large plate fragments.
Middle Ordovician: Harding Sandstone, Bed 19, R. H. D.
Wyoming: Sheridan County: Bear Rocks, NW¼, NE¼, NW¼, Sec. 26, T55N, R89W.
Collector: Robert H. Denison, 1964.
Denison, Robert H. 1967. Ordovician vertebrates from western U.S. Fieldiana: Geology, 16(6): 131–192. Desc. (pp. 146–162) & fig. Fig. 9A–C (p. 151), fig. 10D–F (p. 153), fig. 11A,B (p. 156), fig. 12A–D (p. 158).
Paratypes:
FMNH 4635 Slide. Desc. (pp. 154–155) & fig. Fig. 10E (p. 153).
FMNH 4637 Slide. Desc. (p. 159).
FMNH 4646 Slide. Desc. (p. 159).
FMNH 4648 Slide. Desc. (pp. 154–155).
FMNH 4649 Slide. Desc. (p. 159).
FMNH 4682 Slide. Desc. (pp. 152, 159) & fig. Fig. 10D (p. 153), fig. 11A (p. 156).
FMNH 4698 Slide. Desc. (p. 159) & fig. Fig. 12D (p. 158).
FMNH 4699 Slide. Desc. (pp. 152, 157) & fig. Figs. 10F (p. 153), fig. 12A (p. 158).
FMNH 4701 Slide. Desc. (p. 156) & fig. Fig. 12C (p. 158).
PF 5424f Scales and plates. Desc. (p. 150) & fig. Fig. 8C (p. 149).
PF 5425b Scales and plates. Desc. (p. 146) & fig. Figs. 7B,C (p. 148).
PF 5425d Plates. Desc. (p. 146) & fig. Fig. 6D (p. 147).
PF 5426 Plate fragments. Desc. (p. 146).
PF 5427b Plates. Desc. (p. 150) and fig. Fig. 8B (p. 149).
PF 5427f–h Plates. Desc. (p. 156).
PF 5428c Plates. Desc. (p. 146) & fig. Fig. 6A (p. 147).
PF 5429b Plates. Desc. (pp. 146, 156).
PF 5430a Plates and scale. Desc. (p. 146) and fig. Fig. 8D (p. 147).
PF 5431d Plates and scale. Desc. (pp. 146, 148).
PF 5432 Scales. Desc. (p. 146).
PF 5433b Plates. Desc. (pp. 150, 155) & fig. Fig. 8D (p. 149).
PF 5434a Plates. Desc. (p. 146) & fig. Fig. 6C (p. 147).
PF 5434b–d Plates. Desc. (p. 147).
PF 5435b Plates. Desc. (p. 155) and fig. Fig. 6F (p. 147).
PF 5436c Plates and scale. Desc. (pp. 150, 155) & fig. Fig. 8E (p. 149).
PF 5436h Plates. Desc. (p. 156).
PF 5437a–j Marginal plates. Desc. (pp. 146, 148).
PF 5439a Scales. Desc. (pp. 150, 155) & fig. Fig. 9A (p. 151).
PF 5439c Scales. Desc. (p. 150).
PF 5439d Scales. Desc. (p. 150) & fig. Fig. 9C (p. 151).
PF 5440 Plates and scale. Desc. (p. 146).
PF 5441 Plates and scale. Desc. (p. 146).
PF 5442c Marginal plates. Desc. (p. 148) & fig. Fig. 7A (p. 148).
PF 5443 Plate fragments. Desc. (p. 146).

Order **CYATHASPIDIDA** Tarlo, 1962
Family **CYATHASPIDAE** Kiaer, 1932

Allocryptaspis laticostatus Denison, 1960
PF 1701 Holotype. Dorsal shield in counterpart.
Lower Devonian: Lower Siegenian, Holland Quarry Shale.
Ohio: Lucas County: Holland Quarry, 2.25 mi SSW of Holland, Monclova Twp., S½, Sec. 29.
Collector: J. Ernest Carman.
Denison, Robert H. 1960. Fishes of the Devonian Holland Quarry Shale of Ohio. Fieldiana: Geology, 11(10): 555–613. Desc. (pp. 555–567) & fig. Fig. 117A (p. 557).
Paratypes:
PF 1702–PF 1736 Dorsal shields, mostly complete. Desc. (p. 555).
PF 1737–PF 1762 Ventral shields, incomplete. Desc. (p. 555).

PF 1763–PF 1770 Postoral plate. Desc. (p. 555).
PF 1771–PF 1774 Scales. Desc. (p. 556).
PF 1775–PF 1776 Possible oral plates. Desc. (p. 556).
PF 1777–PF 1778 Suborbital plates. Desc. (p. 555).
PF 1779–PF 1780 Oral-lateral plates. Desc. (p. 555).
PF 1781–PF 1783 Posterolateral plates. Desc. (p. 555).
PF 1811 Dorsal shield. Desc. (p. 555).
PF 1813–PF 1822 Scales. Desc. (p. 556).
PF 1826–PF 1827 Suborbital plates. Desc. (p. 555).
PF 1828 Posterolateral plates. Desc. (p. 555).
PF 1829 Anterolateral plates. Desc. (p. 555).
PF 1830 Possible oral plate. Desc. (p. 556).
PF 1831–PF 1833 Suborbital plates. Desc. (p. 555).
PF 1834–PF 1835 Undetermined plates. Desc. (p. 556).

Allocryptaspis utahensis Denison, 1953
PF 737 Holotype. Dorsal and ventral shields, associated body scales.
Early Devonian: Water Canyon Fm.
Utah: Cache County: Cottonwood Canyon, NW¼, Sec. 18, T13N, R3E, Site 6.
Collectors: Robert H. Denison, William D. and Priscilla F. Turnbull, July 1950.
Denison, Robert H. 1953. Early Devonian fishes from Utah. Part II. Heterostraci. Fieldiana: Geology, 11(7): 291–355. Desc. (pp. 294–304) & fig. Fig. 61 (p. 295), fig. 62 (p. 297).
Paratypes:
PF 342 Partial ventral shield. Desc. (pp. 298–299).
PF 738 Nearly complete ventral shield. Desc. (pp. 294–295, 298–299, 302) & fig. Fig. 61 (p. 295), fig. 62 (p. 297).
PF 739 Incomplete dorsal shield. Desc. (pp. 294, 299).
PF 741 Partial ventral shield. Desc. (p. 298).
PF 743 Incomplete branchial plate. Desc. (p. 299).
PF 744 Incomplete branchial plate. Desc. (p. 299).
PF 749 Right dorsolateral scale. Desc. (p. 303) & fig. Fig. 65B (p. 303).

Americaspis americana (Claypole, 1885)
= Originally described as *Palaeaspis americana* Claypole, 1885.
PF 3822 Cast of holotype. Original at Los Angeles County Museum, LACM 6393.
Late Silurian: Wills Creek Fm., Landisburg sandstone member.
Pennsylvania: Perry County.
Claypole, E. W. 1885. On the recent discovery of pteraspidian fish in the Upper Silurian rocks of North America. Quarterly Journal of the Geological Society of London, 41: 48–64. Desc. (pp. 48–64) & fig. Fig. 7.

Americaspis claypolei Denison, 1964
PF 866 Holotype. Dorsal shield.
Late Silurian: High Falls Fm., Longwood Shale.
New York: Orange County: Greenville Twp., Shin Hollow along Erie Railroad tracks, about 1.75 mi SSE of Graham Station, Locality La.
Collectors: Robert H. and L. B. Denison, Aug. 1951.
Denison, Robert H. 1964. The Cyathaspididae. A family of Silurian and Devonian jawless vertebrates. Fieldiana: Geology, 13(5): 311–473. Desc. (pp. 416–419) & fig. Fig. 141A,B (p. 417).
Paratypes:
PF 862 Incomplete dorsal shields. Desc. (pp. 418–419).
PF 865 Fragments of dorsal shields. Desc. (pp. 418–419).
PF 3641 Incomplete dorsal shields. Desc. (pp. 418–419).
PF 3643 Incomplete dorsal shields. Desc. (p. 418).

Anglaspis expatriata Denison, 1964
PF 3672 Cast of holotype. Dorsal shield. Original at the National Museum of Canada, #10038.
Early Devonian.
Canada: Northwest Territories: Beside Keele River, Top of Mount Sekwi, 63°28′N lat., 128°40′W long., California Standard Company Locality Z 29-61, 4474′.
Denison, Robert H. 1964. The Cyathaspididae. A family of Silurian and Devonian jawless vertebrates. Fieldiana: Geology, 13(5): 311–473. Desc. (pp. 431–433) & fig. Fig. 151A (p. 432).
Paratypes:
PF 3665 Flattened dorsal shield and scales in counterpart. Desc. (p. 432).
PF 3666 Incomplete dorsal and ventral shields, inner sides. Desc. (p. 432) & fig. Fig. 151B (p. 432).

PF 3667 Incomplete ventral shields. Desc. (p. 432).

PF 3668–PF 3671 Shield fragments. Desc. (p. 432).

Anglaspis insignis Kiaer, 1932

PF 1132 Cast of holotype. Five shields on slab, PMOD 186.

Early Devonian: Anglaspis Horizon, Red Bay Series, Fraenkelryggen Group.

Spitsbergen: Red Bay: Fraenkelryggen.

Kiaer, Johan. 1932. The Downtonian and Devonian vertebrates of Spitzbergen. IV. Suborder Cyathaspida. Skrifter om Svalbard og Ishavet, 52: 1–26. Desc. (p. 20) & fig. Pl. VII, figs. 1, 2.

Archegonaspis drummondi Flower & Wayland-Smith, 1952

PF 3266 Cast of holotype. Original at Museum of Comparative Zoology. Inner surface of dorsal shield.

Late Silurian: Salina Group, Vernon Shale.

New York: Oneida County: About 2 mi SE of Kenwood.

Flower, R. H., and R. Wayland-Smith. 1952. Cyathaspid fishes from the Vernon Shale of New York. Bulletin of the Museum of Comparative Zoology, 107(6): 355–387. Desc. (pp. 380–381) & fig. Pl. 2, figs. 1, 2.

Archegonaspis integer schmidti (Geinitz, 1884)

= Originally described as *Cyathaspis schmidti* Geinitz, 1884.

PF 1128 Cast of holotype for *Cyathaspis schmidti* Geinitz, 1884. Ventral shield. Originals at Oslo Paleontology Museum.

Late Silurian: Graptolithengestein.

Germany: Bahnhof: Rostock.

Geinitz, F. E. 1884. Ueber ein Graptolithenführendes Geschiebe mit Cyathaspis von Rostock. Zeitschrift der Deutschen geologischen Gesellschaft, 36(4): 854–857.

Ariaspis ornata Denison, 1963

PF 3707 Cast of holotype. Dorsal shield. Original at Princeton University, PU 17103.

Late Silurian.

Canada: SE Yukon: Beaver River.

Collectors: E. W. Bamber and W. D. MacDonald.

Denison, Robert H. 1963. New Silurian Heterostraci from southeastern Yukon. Fieldiana: Geology, 14(7): 105–141. Desc. (pp. 120–123) & fig. Fig. 68 (p. 121), fig. 69 (p. 122).

Cyathaspis acadica (Matthew, 1888)

= Originally described as *Diplaspis acadica* Matthew, 1888.

PF 3777 Cast of holotype for *Diplaspis acadica* Matthew, 1888. Original at Royal Ontario Museum, ROM 1117. Plates.

Silurian.

Canada: New Brunswick: Kings County: Nerepis River.

Matthew, G. F. 1888. On some remarkable organisms of the Silurian and Devonian rocks in southern New Brunswick. Royal Society of Canada, Proceedings and Transcripts, 6(1) Sec. 4: 49–62. Desc. (pp. 49–62) & fig. Pl. 4.

Dikenaspis yukonensis Denison, 1963

PF 3294 Cast of holotype. Original at Princeton University, PU 17088. Dorsal shield and posterior part of ventral shield.

Silurian: Downtonian (?).

Canada: SE Yukon: Beaver River, 60°27′N lat., 125°46′W long.

Collectors: E. W. Bamber and W. D. MacDonald.

Denison, Robert H. 1963. New Silurian Heterostraci from southeastern Yukon. Fieldiana: Geology, 14(7): 105–141. Desc. (pp. 116–129) & fig. Fig. 66 (p. 118), fig. 67 (p. 119).

Dinaspidella robusta (Kiaer, 1932)

= Originally described as *Dinapsis robusta* Kiaer, 1932.

PF 1148 Cast of holotype for *Dinapsis robusta* Kiaer, 1932. Original at Oslo Paleontological Museum, PMOD 454.

Early Devonian: Red Bay Series, Fraenkelryggen Group, Primaeva Horizon.

Spitsbergen: Fraenkelryggen: Red Bay.

Kiaer, Johan. 1932. The Downtonian and Devonian vertebrates of Spitsbergen. IV. Suborder Cyathaspida. Skrifter om Svalbard og Ishavet, 52: 1–26. Desc. (p. 18) & fig. Figs. 7, 8 (p. 16), pl. IV, figs. 2, 3.

Homalaspidella borealis Denison, 1963

PF 3706 Cast of holotype. Original at Princeton University, PU 17101. Dorsal shield.

Late Silurian.

Canada: Southeastern Yukon: Beaver River.

Collectors: E. W. Bamber and W. D. MacDonald.

Denison, Robert H. 1963. New Silurian Heterostraci from southeastern Yukon. Field-

iana: Geology, 14(7): 105–141. Desc. (pp. 123–127) & fig. Fig. 70 (p. 124), fig. 71 (p. 125), fig. 72 (p. 126).

Homalaspidella nitida (Kiaer, 1932)

= Originally described as *Homalaspis nitida* Kiaer, 1932.

PF 1145 Cast of holotype for *Homalaspis nitida* Kiaer, 1932. Original at Oslo Paleontological Museum, PMOD 156. Shield.

Early Devonian: Red Bay Series, Horizon A. Spitsbergen: Red Bay.

Kiaer, Johan. 1932. The Downtonian and Devonian vertebrates of Spitsbergen. IV. Suborder Cyathaspida. Skrifter om Svalbard og Ishavet, 52: 1–26. Desc. (pp. 14–125) & fig. Fig. 6 (p. 15), pl. IV, fig. 1.

Listraspis canadensis Denison, 1964

PF 3694 Cast of holotype. Original at National Museum of Canada, No. 10030. Dorsal shield.

Early Devonian.

Canada: British Columbia: On Alaska Highway, Mile 450, 59°7′30″N lat., 126°22′W long., about 30 mi NW of Muncho Lake, Locality R5-61, 2100′ of California Standard Company.

Denison, Robert H. 1964. The Cyathaspididae. A family of Silurian and Devonian jawless vertebrates. Fieldiana: Geology, 13(5): 311–473. Desc. (pp. 391–396) & fig. Fig. 131 (p. 391).

Paratypes:

PF 3682 Incomplete dorsal shield. Desc. (pp. 391, 395) & fig. Fig. 132 (p. 393).

PF 3683a Incomplete dorsal shield and large piece of ventral disc. Desc. (pp. 391, 392, 394) & fig. Fig. 133A (p. 395).

PF 3684 Incomplete dorsal shield. Desc. (p. 391).

PF 3685 Incomplete dorsal shield, thin section made. Desc. (p. 391).

PF 3687 Ventral shield. Desc. (p. 391) & fig. Fig. 133B (p. 395).

PF 3688–PF 3690 Ventral shield. Desc. (p. 391).

PF 3691 Ventral shield, thin section made. Desc. (p. 391).

PF 3692–PF 3693 Ventral shield. Desc. (p. 391).

Pionaspis acuticosta Denison, 1964

PF 3703 Cast of holotype. Original at National Museum of Canada, No. 10034. Incomplete dorsal shield.

Early Devonian.

Canada: British Columbia: About 30 mi NW of Muncho Lake, on Alaska Highway, Mile 450, 59°7′30″N lat., 126°22′W long., Locality R5-61, 2100′ of California Standard Company.

Denison, Robert H. 1964. The Cyathaspididae. A family of Silurian and Devonian jawless vertebrates. Fieldiana: Geology, 13(5): 311–473. Desc. (pp. 388–390) & fig. Fig. 129 (p. 388), fig. 130A,B (p. 389).

Pionaspis planicosta Denison, 1964

PF 3702 Cast of holotype. Original at National Museum of Canada, No. 10035. Dorsal shield.

Early Devonian.

Canada: British Columbia: About 30 mi NW of Muncho Lake, on Alaska Highway, mile 450, 59°7′30″N lat., 126°22′W long., Locality R5-61, 2100′ of California Standard Company.

Denison, Robert H. 1964. The Cyathaspididae. A family of Silurian and Devonian jawless vertebrates. Fieldiana: Geology, 13(5): 311–473. Desc. (pp. 386–388) & fig. Fig. 126A,B (p. 386), fig. 127 (p. 387).

Paratype:

PF 3681 Ventral shield. Desc. (p. 387) & fig. Fig. 128 (p. 387).

Poraspis cylindrica Kiaer, 1932

PF 1144 Cast of holotype. Original at Oslo Paleontological Museum, PMOD 205. Dorsal shield.

Early Devonian: Ben Nevis Group, Benneviaspis Horizon.

Spitsbergen: Red Bay: Ben Nevis.

Kiaer, Johan. 1932. The Downtonian and Devonian vertebrates of Spitsbergen. IV. Suborder Cyathaspida. Skrifter om Svalbard og Ishavet, 52: 1–26. Desc. (p. 14) & fig. Pl. III, fig. 3.

Poraspis magna Kiaer, 1932

PF 1142 Cast of holotype. Original at Oslo Paleontological Museum, PMOD 203. Dorsal shield.

Early Devonian: Red Bay Series, Ben Nevis Group, Horizon A.

Spitsbergen: Red Bay: Ben Nevis.

Kiaer, Johan. 1932. The Downtonian and De-

vonian vertebrates of Spitsbergen. IV. Suborder Cyathaspida. Skrifter om Svalbard og Ishavet, 52: 7–26. Desc. (p. 14).

Ptomaspis canadensis Denison, 1963
PF 3296 Cast of holotype. Original at Princeton University, PU 17090. Nearly complete dorsal shield.
Silurian: Downtonian (?).
Canada: Southeastern Yukon: Beaver River, 60°27′N lat., 125°46′W long.
Collectors: E. W. Bamber and W. D. MacDonald.
Denison, Robert H. 1963. New Silurian Heterostraci from southeastern Yukon. Fieldiana: Geology, 14(7): 105–141. Desc. (pp. 113–116) & fig. Fig. 64 (p. 114), fig. 65 (p. 115).

Seretaspis zychi Stensiö, 1958
PF 3659 Cast of holotype. Original at Naturistoriska Riksmusset, C1618,a,b.
Devonian: Downtonian: Presumably Czortków Series.
Podolia.
Stensiö, E. 1958. Les Cyclostomes Fossiles ou Ostracodermes. *In* Grassé, P.-P. (ed.). Traité de Zoologie Anatomie, Systématique, Biologie, 13(fasc. 1): 173–425. Desc. (pp. 371, 384, 386, 391, 393) & fig. Fig. 204 (p. 381).

Vernonaspis allenae Flower & Wayland-Smith, 1952
PF 3262 Cast of holotype. Original at Museum of Comparative Zoology. Dorsal shield in counterpart.
Late Silurian: Salina Group, Vernon Shale.
New York: Oneida County: About 2 mi SE of Kenwood.
Flower, R. H., and R. Wayland-Smith. 1952. Cyathaspid fishes from the Vernon Shale of New York. Bulletin of the Museum of Comparative Zoology, 107(6): 355–387. Desc. (pp. 375–376) & fig. Pl. 1, pl. 2, figs. 3, 8.

Vernonaspis bamberi Denison, 1963
PF 3287 Cast of holotype. Original at Princeton University, PU 17081. Dorsal shield, nearly complete.
Silurian: Downtonian (?)
Canada: Southeastern Yukon: Beaver River, 60°27′N lat., 125°46′W long.
Collectors: E. W. Bamber and W. D. MacDonald, 1960.
Denison, Robert H. 1963. New Silurian Heterostraci from southeastern Yukon. Fieldiana: Geology, 14(7): 105–141. Desc. (pp. 108–110) & fig. Fig. 60 (p. 109), fig. 61 (p. 110).

Vernonaspis bryanti Denison, 1964
PF 838 Holotype. Dorsal shield.
Late Silurian: High Falls Fm.
New Jersey: Sussex County: Montague Twp., grove along New Jersey Highway 23, near Mill Brook, road cut opposite Vies Lunch Stand, Locality 1, east side of New Jersey Highway 23, 0.9 mi (1.4 mi by road) SSE of Duttonville.
Collectors: Robert H. and L. B. Denison.
Denison, Robert H. 1964. The Cyathaspididae. A family of Silurian and Devonian jawless vertebrates. Fieldiana: Geology, 13(5): 309–473. Desc. (pp. 376–379) & fig. Fig. 119 (p. 377), fig. 120 (p. 378).
Paratypes:
PF 839 Dorsal shield. Desc. (pp. 377–378).
PF 841 Dorsal shields. Desc. (p. 377).
PF 842 Ventral shield. Desc. (p. 377).
PF 845 Dorsal shield fragment. Desc. (p. 377).
PF 855 Ventral shield. Desc. (pp. 377, 379).
PF 3646 Incomplete dorsal and ventral shields. Desc. (pp. 378–379).
PF 3711 (cast of PU 12922, original at Princeton University) Cast of dorsal shield. Desc. (p. 377).

Vernonaspis leonardi Flower & Wayland-Smith, 1952
PF 3263 Cast of holotype. Original at Museum of Comparative Zoology. Dorsal shield.
Late Silurian: Salina Group, Vernon Shale.
New York: Oneida County: About 2 mi SE of Kenwood.
Flower, R. H., and R. Wayland-Smith. 1952. Cyathaspid fishes from the Vernon Shale of New York. Bulletin of the Museum of Comparative Zoology, 107(6): 355–387. Desc. (pp. 376–378) & fig. Fig. 1 (p. 377); pl. 2, figs. 6, 7; pl. 3, fig. 5; pl. 15, fig. 2.

Vernonaspis major Denison, 1963
PF 3708 Cast of holotype. Original at Princeton University, PU 17104. Dorsal shield.
Late Silurian.
Canada: Southeastern Yukon: Beaver River.
Collectors: E. W. Bamber and W. D. MacDonald, 1960.
Denison, Robert H. 1963. New Silurian Het-

erostraci from southeastern Yukon. Fieldiana: Geology, 14(7): 105–141. Desc. (pp. 110–113) & fig. Fig. 62 (p. 111), fig. 63 (p. 112).

Vernonaspis sekwiae Denison, 1964

PF 3679 Cast of holotype. Original at National Museum of Canada, No. 10036. Dorsal shield.

Late Silurian.

Canada: Northwest Territories: Beside Keele River, top of Mt. Sekwi, 63°28′N lat., 128°40′W long.

Denison, Robert H. 1964. The Cyathaspididae. A family of Silurian and Devonian jawless vertebrates. Fieldiana: Geology, 13(5): 309–473. Desc. (pp. 382–384) & fig. Fig. 123A–C (p. 382), fig. 124 (p. 383).

Paratypes:

PF 3673 Crushed dorsal shield. Desc. (pp. 383–384).

PF 3674 Incomplete dorsal shield. Desc. (p. 383).

PF 3675 Incomplete ventral shield. Desc. (pp. 383–384).

PF 3676 Incomplete ventral shield. Desc. (p. 383).

PF 3677 Shield fragment. Desc. (p. 383).

PF 3678 Shield fragment. Desc. (p. 383).

Order **TRAQUAIRASPIDIDA** Stensiö, 1958
Family **TRAQUAIRASPIDIDAE** Kiaer, 1932

Traquairaspis angusta Denison, 1963

PF 3710 Cast of holotype. Original at Princeton University, PU 17388. Ventral disc.

Late Silurian.

Canada: Southeastern Yukon: Beaver River, 60°27′N lat., 125°47.5′W long.

Collectors: E. W. Bamber and W. D. MacDonald.

Denison, Robert H. 1963. New Silurian Heterostraci from southeastern Yukon. Fieldiana: Geology, 14(7): 105–141. Desc. (pp. 133–135) & fig. Fig. 78 (p. 133), fig. 79 (p. 135).

Order **PTERASPIDIDA**
Family **PTERASPIDIDAE** Claypole, 1885
Subfamily **PTERASPIDINAE** Denison, 1970

Althaspis whitei (Denison, 1955)

= Originally described as *Pteraspis whitei* Denison, 1955.

PF 1002 Holotype for *Pteraspis whitei* Denison, 1955. Dorsal shield.

Early Devonian: Lower Dittonian: Knoydart Fm., about 100 ft above bed 44 of Fletcher's section, thus presumably in his bed 53; or probably in bed 22 of the selection of Leonard (1951, p. 72); about 560 ft above the lowest exposure of the Knoydart Fm.

Canada: Nova Scotia: Antigonish County: About 3 mi SW of Arisaig, a small knoll on the west side of the McAras Brook road.

Collector: Robert H. Denison, July 1952.

Denison, Robert H. 1955. Early Devonian vertebrates from the Knoydart Formation of Nova Scotia. Fieldiana: Zoology, 37: 449–464. Desc. (pp. 450–454) & fig. Fig. 109 (p. 451).

Paratypes:

PF 1002 Associated ventral disc. Desc. (pp. 450, 454) & fig. Fig. 109 (p. 451).

PF 1191 Incomplete dorsal shield. Desc. (pp. 452–453).

PF 1192 Ventral disc, in counterpart. Desc. (pp. 452, 454).

PF 1193 Incomplete dorsal shield, in counterpart. Desc. (pp. 452–454).

PF 1194 Fragment of dorsal shield, in counterpart. Desc. (pp. 452, 454).

PF 1195–PF 1196 Rostral plate. Desc. (p. 452).

PF 1197 Rostral, orbital, and pineal plates. Desc. (p. 452).

PF 1198–PF 1200 Orbital plate. Desc. (p. 452).

PF 1201–PF 1202 Dorsal spine. Desc. (p. 452).

PF 1203 Cornual plate. Desc. (p. 452).

PF 1204–PF 1207 Branchial plate. Desc. (p. 452).

PF 1208–PF 1209 Lateral plate. Desc. (p. 452).

PF 1210 Ridge scales. Desc. (p. 452).

PF 1211 Ridge scales. Desc. (p. 452).

Lampraspis tuberculata Denison, 1970

PF 4342 Holotype. Dorsal shield.

Early Devonian: Beartooth Butte Fm.

Wyoming: Big Horn County: South side of Cottonwood Canyon, NE¼, Sec. 4, T56N, R31W.

Collectors: Robert H. Denison and Eugene S. Richardson, Jr.

Denison, Robert H. 1970. Revised classification of Pteraspididae with description of new forms from Wyoming. Fieldiana: Ge-

ology, 20(1, publ. #1106): 1–41. Desc. (pp. 32–34) & fig. Fig. 24 (p. 33), fig. 25A (p. 34).

Paratypes:

PF 4141 Juvenile ventral disc. Desc. (p. 33).

PF 4341 Dorsal shield. Desc. (p. 33).

PF 4351 Incomplete dorsal shield. Desc. (p. 33).

PF 4366 Ventral disc. Desc. (p. 33).

PF 4370 Dorsal shield. Desc. (p. 32).

PF 4371 Incomplete dorsal disc with spine. Desc. (p. 33).

PF 4373 Two dorsal discs, one with spine. Desc. (p. 33).

PF 4374 Dorsal disc with spine. Desc. (p. 33).

PF 4385 Branchial plate. Desc. (p. 33).

PF 4393 Dorsal disc (juv.). Desc. (p. 33).

PF 4400 Dorsal disc (juv.). Desc. (p. 33).

PF 4407 Dorsal disc (juv.). Desc. (p. 33).

PF 4417 Dorsal disc (juv.). Desc. (p. 33).

PF 4432 Dorsal disc (juv.). Desc. (p. 33).

PF 4436 Dorsal disc (juv.). Desc. (p. 33).

PF 4440–PF 4441 Ventral disc (juv.). Desc. (p. 33).

PF 4445 Ventral disc (juv.). Desc. (p. 33).

PF 4448 Ventral disc (juv.). Desc. (p. 33).

PF 4455–PF 4457 Ventral disc (juv.). Desc. (p. 33).

PF 4459 Ventral disc (juv.). Desc. (p. 33).

PF 4462 Ventral disc (juv.). Desc. (p. 33).

PF 4464–PF 4465 Ventral disc (juv.). Desc. (p. 33).

PF 4467–PF 4468 Ventral disc (juv.). Desc. (p. 33).

PF 4470 Ventral disc (juv.). Desc. (p. 33).

PF 4479 Ventral disc (juv.). Desc. (p. 33).

PF 4754 Dorsal and ventral shields. Desc. (pp. 32, 35–36).

PF 4756 Dorsal shield. Desc. (p. 32).

PF 4761 Incomplete dorsal shield. Desc. (p. 33).

PF 4767 Fragment of dorsal shield. Desc. (p. 33).

PF 4771 Dorsal disc. Desc. (p. 33).

PF 4476 Dorsal disc. Desc. (p. 33).

PF 4784 Ventral disc (inner side). Desc. (p. 33).

PF 4786 Ventral disc (inner side). Desc. (p. 33).

PF 4913 Dorsal shield. Desc. (pp. 32, 35) & fig. Fig. 7D (p. 13).

PF 4916 Dorsal shield. Desc. (p. 32).

PF 4919–PF 4920 Dorsal shield. Desc. (p. 32).

PF 4922 Incomplete dorsal shield. Desc. (p. 32).

PF 4925 Dorsal shield (inner side). Desc. (pp. 32–33) & fig. Fig. 25B (p. 34).

PF 4927 Dorsal shield (inner side). Desc. (p. 33).

PF 4928 Dorsal shield. Desc. (p. 32).

PF 4941 Fragment of dorsal shield. Desc. (p. 33).

PF 4943 Fragment of dorsal shield. Desc. (p. 33).

PF 4946 Ventral disc and associated scales. Desc. (p. 33).

PF 4952 Articulated but incomplete fish. Desc. (p. 33).

PF 4954–PF 4955 Articulated juvenile. Desc. (p. 33).

PF 4972–PF 4973 Dorsal disc (juv.). Desc. (p. 33).

PF 4976 Dorsal disc (juv.). Desc. (p. 33).

PF 4980 Dorsal disc (juv.). Desc. (p. 33).

PF 4982–PF 4983 Dorsal disc (juv.). Desc. (p. 33).

PF 5019 Dorsal disc (juv.). Desc. (p. 33).

PF 5023 Dorsal disc (juv.). Desc. (p. 33).

PF 5046 Dorsal disc (juv.). Desc. (p. 33).

PF 5064 Dorsal disc (juv.). Desc. (p. 33).

PF 5068 Dorsal disc (juv.). Desc. (p. 33).

PF 5078 Dorsal disc (juv.). Desc. (p. 33).

PF 5095–PF 5096 Ventral disc (juv.). Desc. (p. 33).

PF 5096 Ventral disc (juv.). Desc. (p. 33).

PF 5099 Ventral disc (juv.). Desc. (p. 33).

PF 5103 Ventral disc (juv.). Desc. (p. 33).

PF 5105 Ventral disc (juv.). Desc. (p. 33).

PF 5107–PF 5108 Ventral disc (juv.). Desc. (p. 33).

PF 5111 Ventral disc (juv.). Desc. (p. 33).

PF 5116 Ventral disc (juv.). Desc. (p. 33).

PF 5118–PF 5119 Ventral disc (juv.). Desc. (p. 33).

PF 5125–PF 5129 Ventral disc (juv.). Desc. (p. 33).

PF 5131 Ventral disc (juv.). Desc. (p. 33).

PF 5134–PF 5136 Ventral disc (juv.). Desc. (p. 33).

PF 5138 Ventral disc (juv.). Desc. (p. 33).

PF 5150 Ventral disc. Desc. (p. 33).

PF 5154 Ventral disc (juv.). Desc. (p. 33).

PF 5162–PF 5163 Ventral disc (juv.). Desc. (p. 33).

PF 5170 Ventral disc (juv.). Desc. (p. 33).

PF 5172 Ventral disc (juv.). Desc. (p. 33).

PF 5174 Ventral disc (juv.). Desc. (p. 33).
PF 5182–PF 5183 Ventral disc (juv.). Desc. (p. 33).
PF 5188 Ventral disc (juv.). Desc. (p. 33).
PF 5190 Ventral disc (juv.). Desc. (p. 33).
PF 5199 Orbital plate. Desc. (p. 33).
PF 5202 Orbital plate. Desc. (p. 33).
PF 5204 Orbital plate. Desc. (p. 33).
PF 5212 Orbital plate. Desc. (p. 33).
PF 5214 Orbital plate. Desc. (p. 33).
PF 5216–PF 5217 Orbital plate. Desc. (p. 33).
PF 5222 Orbital plate. Desc. (p. 33).
PF 5225 Orbital plate. Desc. (p. 33).
PF 5229–PF 5232 Orbital plate. Desc. (p. 33).
PF 5238–PF 5240 Orbital plate. Desc. (p. 33).
PF 5244–PF 5247 Orbital plate. Desc. (p. 33).
PF 5250 Orbital plate. Desc. (p. 33).
PF 5254–PF 5255 Orbital plate. Desc. (p. 33).
PF 5261 Rostral plate. Desc. (p. 33) & fig. Fig. 26 (p. 35).
PF 5263 Rostral plate. Desc. (p. 33).
PF 5270–PF 5273 Rostral plate. Desc. (p. 33).
PF 5287 Rostral plate. Desc. (p. 33).
PF 5290 Rostral plate. Desc. (p. 33).
PF 5297 Rostral plate, orbital plate. Desc. (p. 33).
PF 5306 Branchial plate. Desc. (p. 33).
PF 5317–PF 5318 Branchial plate. Desc. (p. 33).
PF 5323 Branchial plate. Desc. (p. 33).
PF 5350 Dorsal disc fragment with spine. Desc. (p. 33).
PF 5865 Dorsal shield. Desc. (p. 32).

Oreaspis williamsi Denison, 1970
PF 868 Holotype. Flattened dorsal shield.
Early Devonian: Card member of Water Canyon Fm.
Utah: Cache County: Blacksmith Fork, about 12 mi SE of Logan, Locality A.
Denison, Robert H. 1970. Revised classification of Pteraspididae with description of new forms from Wyoming. Fieldiana: Geology, 20(1, publ. #1106): 1–41. Desc. (pp. 29–30) & fig. Fig. 22A,B (p. 30).

Protaspis brevispina Denison, 1970
PF 4343 Holotype. Dorsal shield.
Early Devonian: Beartooth Butte Fm.
Wyoming: Big Horn County: South side of Cottonwood Canyon, east of Lovell, NE¼, Sec. 4, T56N, R93W.
Collectors: Robert H. Denison and Eugene S. Richardson, Jr.
Denison, Robert H. 1970. Revised classification of Pteraspididae with description of new forms from Wyoming. Fieldiana: Geology, 20(1, publ. #1106): 1–41. Desc. (pp. 15–17) & fig. Fig. 7B (p. 13), fig. 8 (p. 14), fig. 11A (p. 18).
Paratypes:
PF 4340 Dorsal shield. Desc. (p. 15).
PF 4344 Dorsal shield and 5 scraps. Desc. (p. 15).
PF 4345 Associated dorsal and ventral discs. Desc. (p. 15).
PF 4346 Dorsal shield. Desc. (p. 15).
PF 4347 Dorsal shield and fragment of counterpart. Desc. (p. 15).
PF 4348 Incomplete dorsal shield. Desc. (p. 15).
PF 4352 Incomplete dorsal shield and part of second. Desc. (p. 15).
PF 4360 Ventral disc. Desc. (p. 15).
PF 4365 Dorsal and ventral discs and branchial plates. Desc. (pp. 15–16)
PF 4368 Ventral disc. Desc. (p. 15).
PF 4372 Dorsal disc with spine. Desc. (p. 15).
PF 4376 Branchial plate and incomplete rostral. Desc. (p. 15).
PF 4377 Branchial plate. Desc. (p. 15).
PF 4380–PF 4381 Branchial plate. Desc. (p. 15).
PF 4388 Dorsal disc with spine. Desc. (p. 15).
PF 4762 Dorsal shield. Desc. (p. 15).
PF 4764 Dorsal shield. Desc. (p. 15).
PF 4766 Dorsal shield. Desc. (p. 15).
PF 4768 Dorsal shield. Desc. (p. 15).
PF 4770 Dorsal shield. Desc. (p. 15).
PF 4779 Ventral disc. Desc. (p. 15).
PF 4785 Ventral disc. Desc. (p. 15).
PF 4910 Dorsal shield. Desc. (p. 15).
PF 4912 Dorsal shield. Desc. (p. 15).
PF 4918 Dorsal shield. Desc. (p. 15).
PF 4923 Associated dorsal and ventral disc. Desc. (p. 15).
PF 4929–PF 4930 Dorsal shield. Desc. (p. 15).
PF 4933–PF 4935 Dorsal shield. Desc. (p. 15).
PF 4937 Dorsal disc. Desc. (p. 15).
PF 4939 Dorsal disc. Desc. (p. 15).
PF 4940 Dorsal shield. Desc. (p. 15).
PF 4947 Ventral disc. Desc. (p. 15).
PF 4959 Incomplete articulated juvenile. Desc. (p. 15).
PF 4986–PF 4987 Dorsal disc. Desc. (p. 15).
PF 4989 Dorsal disc. Desc. (p. 15).
PF 4991 Dorsal disc. Desc. (p. 15).

PF 4999 Dorsal disc. Desc. (p. 15).
PF 5062 Dorsal disc. Desc. (p. 15).
PF 5274 Rostral plate. Desc. (pp. 15–16) & fig. Fig. 10a,b (p. 17).
PF 5279–PF 5280 Rostral plate. Desc. (p. 15).
PF 5296 Rostral plate. Desc. (p. 15) & fig. Fig. 10c (p. 17).
PF 5298 Rostral plate. Desc. (pp. 15–16).
PF 5299 Rostral plate. Desc. (pp. 15–16) & fig. Fig. 9 (p. 15).
PF 5314 Branchial plate. Desc. (p. 15).
PF 5322 Branchial plate. Desc. (p. 15) & fig. Fig. 11B (p. 18).

Protaspis erroli Denison, 1967
PF 3814 Holotype. Dorsal shield.
Early Devonian: Water Canyon Fm., Grassy Flat member (near base).
Utah: Cache County: North side of Logan Canyon, above Card Ranger Station, NE¼, Sec. 24, T12N, R2E.
Collector: J. Stewart Williams.
Denison, Robert H. 1967. A new *Protaspis* from the Devonian of Utah, with notes on the classification of Pteraspididae. Journal of Linnean Society, London (Zoology), 47: 31–37. Desc. (34–37) & fig. Fig. 1 (p. 35), fig. 2 (p. 36), pl. 1.

Protaspis mcgrewi Denison, 1970
PF 4337 Holotype. Dorsal shield.
Early Devonian: Beartooth Butte Fm.
Wyoming: Big Horn County: South side of Cottonwood Canyon, east of Lovell, NE¼, Sec. 4, T56N, R93W.
Collectors: Robert H. Denison and Eugene S. Richardson, Jr.
Denison, Robert H. 1970. Revised classification of Pteraspididae with description of new forms from Wyoming. Fieldiana: Geology, 20(1, publ. #1106): 1–41. Desc. (pp. 11–14) & fig. Fig. 4 (p. 10), fig. 6A (p. 12), fig. 7A (p. 13).
Paratypes:
PF 4356 Dorsal shield. Desc. (p. 11).
PF 4361 Ventral disc. Desc. (p. 11).
PF 4491 Incomplete juvenile dorsal shield. Desc. (p. 11).
PF 4758–PF 4759 Dorsal shield. Desc. (p. 11).
PF 4763 Dorsal shield. Desc. (p. 11).
PF 4911 Dorsal shield. Desc. (p. 11).
PF 4914 Dorsal shield. Desc. (p. 11).
PF 4917 Dorsal shield. Desc. (p. 11).
PF 5265 Rostral plate. Desc. (p. 11).
PF 5267 Rostral plate. Desc. (p. 11).
PF 5269 Rostral plate. Desc. (p. 11).
PF 5278 Rostral plate. Desc. (p. 11).
PF 5284–PF 5285 Rostral plate. Desc. (p. 11).
PF 5288 Rostral plate. Desc. (p. 11).
PF 5295 Rostral plate. Desc. (p. 11).

Protaspis tenuistriatus Denison, 1953
PF 333 Holotype. Incomplete dorsal shield.
Early Devonian: Water Canyon Fm.
Utah: Cache County: Cottonwood Canyon, Bear River Range, NE½, Sec. 19, T13N, R3E, Locality G.
Denison, Robert H. 1953. Early Devonian fishes from Utah. Part II. Heterostraci. Fieldiana: Geology, 11(7): 291–355. Desc. (pp. 343–348) & fig. Fig. 80 (p. 344), fig. 81 (p. 345).
Paratype:
PF 344 Fragment of dorsal shield. Desc. (p. 348).

Protaspis transversa Denison, 1970
PF 4334 Holotype. Dorsal shield.
Early Devonian: Beartooth Butte Fm.
Wyoming: Big Horn County: South side of Cottonwood Canyon, east of Lovell. NE¼, Sec. 4, T56N, R93W.
Collectors: Robert H. Denison and Eugene S. Richardson, Jr.
Denison, Robert H. 1970. Revised classification of Pteraspididae with description of new forms from Wyoming. Fieldiana: Geology, 20(1, publ. #1106): 1–41. Desc. (pp. 21–26) & fig. Fig. 13 (p. 22), fig. 16 (p. 25).
Paratypes:
PF 4335–PF 4336 Dorsal shield. Desc. (p. 21).
PF 4338 Dorsal shield. Desc. (pp. 21, 24).
PF 4339 Dorsal shield. Desc. (p. 21).
PF 4349 Dorsal shield. Desc. (p. 21).
PF 4352 Dorsal shield. Desc. (p. 21) & fig. Fig. 15 (p. 24).
PF 4355 Incomplete dorsal shield, in counterpart. Desc. (p. 21).
PF 4362–PF 4363 Ventral disc. Desc. (p. 21).
PF 4369 Dorsal disc and 2 incomplete ventral discs. Desc. (p. 21).
PF 4375 Dorsal disc. Desc. (p. 21).
PF 4382 Branchial plate. Desc. (p. 22).
PF 4384 Branchial plate. Desc. (p. 22).
PF 4389 Articulated specimen. Desc. (pp. 21, 24–26) & fig. Fig. 17 (p. 25).
PF 4390 Articulated specimen. Desc. (p. 22).
PF 4391 Articulated specimen. Desc. (pp. 22, 24).
PF 4394 Dorsal disc (juv.). Desc. (p. 21).

PF 4403 Dorsal disc (juv.). Desc. (p. 21).
PF 4408 Dorsal disc (juv.). Desc. (p. 21).
PF 4412 Dorsal disc (juv.). Desc. (p. 21).
PF 4416 Dorsal disc (juv.). Desc. (p. 21).
PF 4450–PF 4451 Ventral disc (juv.). Desc. (p. 21).
PF 4453–PF 4454 Ventral disc (juv.). Desc. (p. 21).
PF 4486 Ventral disc (juv.). Desc. (p. 21).
PF 4490 Articulated individual (juv.) in counterpart. Desc. (p. 22).
PF 4492 Dorsal shield (juv.). Desc. (p. 22).
PF 4494 Articulated individual (juv.) in counterpart. Desc. (p. 22).
PF 4496 Associated plates (juv.). Desc. (p. 22).
PF 4755 Dorsal shield. Desc. (p. 21).
PF 4757 Right half of dorsal shield, inner side. Desc. (p. 21).
PF 4760 Dorsal shield. Desc. (p. 21).
PF 4772–PF 4773 Dorsal disc. Desc. (p. 21).
PF 4774 Dorsal disc, inner side. Desc. (p. 21).
PF 4775 Dorsal disc, inner side. Desc. (p. 24).
PF 4780 Incomplete ventral shield. Desc. (p. 21).
PF 4915 Dorsal shield. Desc. (p. 21).
PF 4924 Dorsal shield and portion of another. Desc. (p. 21).
PF 4926 Dorsal shield, inner side. Desc. (p. 21).
PF 4931–PF 4932 Dorsal shield. Desc. (p. 21).
PF 4936 Ventral disc. Desc. (p. 21).
PF 4942 Impression of inner side of anterior end of dorsal shield. Desc. (p. 21).
PF 4944 Fragment of dorsal shield. Desc. (p. 21).
PF 4953 Articulated juvenile in counterpart. Desc. (p. 22).
PF 4969 Dorsal disc and associated scales (juv.) in counterpart. Desc. (p. 22).
PF 4974 Dorsal disc (juv.). Desc. (p. 21).
PF 4977 Dorsal disc (juv.). Desc. (p. 21).
PF 4981 Dorsal disc (juv.). Desc. (p. 21).
PF 4984 Dorsal disc (juv.). Desc. (p. 21).
PF 4994 Dorsal disc (juv.). Desc. (p. 21).
PF 5016 Dorsal disc (juv.). Desc. (p. 21).
PF 5020 Dorsal disc (juv.). Desc. (p. 21).
PF 5050–PF 5051 Dorsal disc (juv.). Desc. (p. 21).
PF 5059 Dorsal disc (juv.). Desc. (p. 21).
PF 5077 Dorsal disc (juv.). Desc. (p. 21).
PF 5122 Ventral disc (juv.). Desc. (p. 21).
PF 5148–PF 5149 Ventral disc. Desc. (p. 21).
PF 5177–PF 5178 Ventral disc (juv.). Desc. (p. 21).
PF 5180 Ventral disc (juv.). Desc. (p. 21).
PF 5184 Ventral disc (juv.). Desc. (p. 21).
PF 5211 Orbital plate. Desc. (p. 21).
PF 5215 Orbital plate. Desc. (p. 22).
PF 5221 Orbital plate. Desc. (p. 22).
PF 5233–PF 5234 Orbital plate. Desc. (p. 22).
PF 5237 Orbital plate. Desc. (p. 22).
PF 5243 Orbital plate. Desc. (p. 22).
PF 5252 Orbital plate. Desc. (p. 22).
PF 5259–PF 5260 Orbital plate. Desc. (p. 22).
PF 5262 Rostral plate. Desc. (p. 21).
PF 5268 Rostral plate. Desc. (p. 21).
PF 5276–PF 5277 Rostral plate. Desc. (p. 21).
PF 5281 Rostral plate. Desc. (p. 21) & fig. Fig. 14 (p. 23).
PF 5291–PF 5294 Rostral plate. Desc. (p. 21).
PF 5300 Branchial plate. Desc. (p. 22).
PF 5307 Branchial plate. Desc. (p. 22).
PF 5311 Branchial plate. Desc. (p. 22).
PF 5315–PF 5316 Branchial plate. Desc. (p. 22).
PF 5319 Branchial plate. Desc. (p. 22).
PF 5324 Branchial plate. Desc. (p. 22).
PF 5349 Dorsal spine. Desc. (p. 22).
PF 5497 Incomplete dorsal shield. Desc. (p. 21).

Psephaspis idahoensis Denison, 1968
PF 5680 Holotype. Dorsal disc and spine; pineal plate.
Middle Devonian: Jefferson Fm., basal Unit.
Idaho: Lemhi County: Head of Spring Mountain Canyon.
Collector: Robert H. Dension.
Denison, Robert H. 1968. Middle Devonian fishes from the Lemhi Range of Idaho. Fieldiana: Geology, 16(10): 269–288. Desc. (pp. 270–282) & fig. Fig. 1 (p. 271).
Paratypes:
FMNH 5188 Slide. Desc. (p. 279).
PF 5661 Fragmentary ventral disc. Desc. (pp. 270, 273) & fig. Fig. 3 (p. 273).
PF 5671 Dorsal disc fragment. Desc. (p. 270).
PF 5674 Fragment of disc (sectioned specimen). Desc. (pp. 270, 277) & fig. Fig. 8B (p. 278).
PF 5675 Fragment of dorsal disc. Desc. (pp. 270, 277, 286) & fig. Fig. 8A (p. 278).
PF 5681 Fragment of dorsal disc. Desc. (pp. 270–271, 277).
PF 5682 Fragment of dorsal disc and spine. Desc. (pp. 270–271, 277).
PF 5683 Fragment of disc. Desc. (pp. 270, 272, 277) & fig. Fig. 7B (p. 276).

Pteraspis carmani Denison, 1960

PF 2018 Holotype. Partial articulated shield.

Early Devonian: Probably lower Siegenian, Holland Quarry Shale.

Ohio: Lucas County: Monclova Twp., S½, Sec 29, Holland Quarry.

Collector: J. Ernest Carman.

Denison, Robert H. 1960. Fishes of the Devonian Holland Quarry Shale of Ohio. Fieldiana: Geology, 11(10): 555–613. Desc. (pp. 568–597) & fig. Fig. 124 (p. 569).

Paratypes:

PF 1866–PF 1868 Dorsal disc. Desc. (p. 568).

PF 1869 Dorsal disc. Desc. (pp. 568, 576–577) & fig. Fig. 126 (p. 573).

PF 1870 Dorsal disc. Desc. (pp. 568, 576) & fig. Fig. 128 (p. 575).

PF 1871 Dorsal disc. Desc. (pp. 568, 577) & fig. Fig. 129C (p. 579).

PF 1872 Dorsal disc. Desc. (pp. 568, 577).

PF 1873 Dorsal disc. Desc. (pp. 568, 576).

PF 1874–PF 1875 Dorsal disc. Desc. (p. 568).

PF 1876 Dorsal disc. Desc. (pp. 568, 576).

PF 1877–PF 1886 Dorsal disc. Desc. (p. 568).

PF 1887 Dorsal disc. Desc. (pp. 568, 577) & fig. Fig. 129E (p. 579).

PF 1888–PF 1890 Dorsal disc. Desc. (p. 568).

PF 1891 Dorsal disc. Desc. (pp. 568, 574, 576).

PF 1892–PF 1897 Dorsal disc. Desc. (pp. 568).

PF 1898 Dorsal disc. Desc. (pp. 568, 575–576).

PF 1899–PF 1901 Dorsal disc. Desc. (p. 568).

PF 1902 Dorsal disc. Desc. (pp. 568, 575).

PF 1903 Dorsal disc. Desc. (p. 568).

PF 1904 Dorsal disc. Desc. (pp. 568, 575).

PF 1905–PF 1907 Dorsal disc. Desc. (p. 568).

PF 1908 Ventral disc. Desc. (pp. 568, 588).

PF 1909 Ventral disc. Desc. (pp. 568, 587).

PF 1910 Ventral disc. Desc. (pp. 568, 587) & fig. Fig. 137 (p. 590).

PF 1911 Ventral disc. Desc. (pp. 568, 587) & fig. Fig. 136 (p. 589).

PF 1912 Ventral disc. Desc. (pp. 568, 587).

PF 1913 Ventral disc. Desc. (pp. 568, 588).

PF 1914–PF 1919 Ventral disc. Desc. (p. 568).

PF 1920–PF 1921 Ventral disc. Desc. (pp. 568, 588).

PF 1922 Ventral disc. Desc. (pp. 568, 588) & fig. Fig. 138 (p. 591).

PF 1923–PF 1927 Ventral disc. Desc. (p. 568).

PF 1928 Ventral disc. Desc. (pp. 568, 588).

PF 1929–PF 1930 Ventral disc. Desc. (pp. 568).

PF 1931 Rostral plate. Desc. (pp. 568, 580).

PF 1932 Rostral plate. Desc. (p. 568) & fig. Fig. 130B (p. 580).

PF 1933–PF 1934 Rostral plate. Desc. (p. 568).

PF 1935 Rostral plate. Desc. (pp. 568, 579).

PF 1936–PF 1938 Rostral plate. Desc. (p. 568).

PF 1939 Rostral plate. Desc. (pp. 568, 579).

PF 1940 Rostral plate. Desc. (p. 568).

PF 1941 Rostral plate. Desc. (pp. 568, 579) & fig. Fig. 130A (p. 580).

PF 1942–PF 1944 Rostral plate. Desc. (p. 568).

PF 1945 Rostral plate. Desc. (pp. 568, 579).

PF 1946 Rostral plate. Desc. (p. 568).

PF 1947 Rostral plate. Desc. (pp. 568, 579).

PF 1948–PF 1955 Rostral plate. Desc. (p. 568).

PF 1956–PF 1961 Orbital plate. Desc. (p. 568).

PF 1962 Orbital plate. Desc. (pp. 568, 584).

PF 1963–PF 1972 Orbital plate. Desc. (p. 568).

PF 1973 Orbital plate. Desc. (p. 568) & fig. Fig. 132 (p. 582).

PF 1974–PF 1976 Orbital plate. Desc. (p. 568).

PF 1977 Orbital plate. Desc. (pp. 568, 584) & fig. Fig. 132 (p. 582).

PF 1978 Orbital plate. Desc. (p. 568).

PF 1979–PF1990 Branchial plate. Desc. (p. 568).

PF 1991 Branchial plate. Desc. (pp. 568, 584, 586) & fig. Fig. 134B (p. 585).

PF 1992–PF 1994 Branchial plate. Desc. (p. 568).

PF 1995 Possible cornual plate. Desc. (pp. 568, 586) & fig. Fig. 135A (p. 586).

PF 1996–PF 1997 Possible cornual plate. Desc. (p. 568).

PF 1998–PF 2009 Various associated plates. Desc. (p. 568).

PF 2010 Pineal plate. Desc. (pp. 568, 581) & fig. Fig. 131B (p. 581).

PF 2011 Pineal plate. Desc. (p. 568).

PF 2012 Pineal plate. Desc. (pp. 568, 581) & fig. Fig. 131C (p. 581).

PF 2013–PF 2015 Pineal plate. Desc. (p. 568).

PF 2016 Pineal plate. Desc. (pp. 568, 581).

PF 2017 Pineal plate. Desc. (pp. 568, 581) & fig. Fig. 131A (p. 581).

PF 2019–PF 2024 Oral plate. Desc. (p. 568).

PF 2025 Oral plate. Desc. (pp. 568, 591) & fig. Fig. 139 (p. 592).

PF 2026 Oral lateral plate. Desc. (p. 568).

PF 2027–PF 2029 Undetermined plate. Desc. (p. 568).

PF 2030 Posterolateral plate. Desc. (pp. 568, 591) & fig. Fig. 139B (p. 592).

PF 2031–PF 2034 Posterolateral plate. Desc. (p. 568).

PF 2035–PF 2039 Lateral plate. Desc. (p. 568).
PF 2040–PF 2045 Anterolateral plate. Desc. (p. 568).
PF 2046 Possible cornual plate. Desc. (pp. 568, 587) & fig. Fig. 135C (p. 586).
PF 2047 Scale. Desc. (pp. 568, 596) & fig. Fig. 141E (p. 595).
PF 2048 Scale. Desc. (pp. 568, 596) & fig. Fig. 141G (p. 595).
PF 2049 Scale. Desc. (pp. 568, 596).
PF 2050 Scale. Desc. (p. 568).
PF 2051 Scale. Desc. (pp. 568, 596) & fig. Fig. 141F (p. 595).
PF 2052 Scale. Desc. (pp. 568, 596).
PF 2053 Scale. Desc. (pp. 568, 596) & fig. Fig. 141H (p. 595).
PF 2054 Scale. Desc. (pp. 568, 596).
PF 2055 Scale. Desc. (pp. 568, 594) & fig. Fig. 141B (p. 595).
PF 2056 Scale. Desc. (pp. 568).
PF 2057 Scale. Desc. (pp. 568) & fig. Fig. 141J (p. 595).
PF 2058 Scale. Desc. (p. 568).
PF 2059–PF 2060 Scale. Desc. (pp. 568, 594).
PF 2061 Scale. Desc. (pp. 568, 594) & fig. Fig. 141A (p. 595).
PF 2062 Scale. Desc. (pp. 568, 594).
PF 2063 Scale. Desc. (pp. 568, 594) & fig. Fig. 141C (p. 595).
PF 2064 Scale. Desc. (pp. 568, 594).
PF 2065 Scale. Desc. (pp. 568, 594) & fig. Fig. 141D (p. 595).
PF 2066 Scale. Desc. (pp. 568, 594).
PF 2067 Possible cornual plate. Desc. (pp. 568, 587) & fig. Fig. 135B (p. 586).
PF 2068 Possible cornual plate. Desc. (pp. 568, 587).
PF 2069 Scale. Desc. (pp. 568, 596) & fig. Fig. 141I (p. 595).
PF 2070 Dorsal spine. Desc. (pp. 568, 578) & fig. Fig. 129B (p. 579).
PF 2071–PF 2074 Dorsal spine. Desc. (p. 568).
PF 2075 Dorsal spine. Desc. (pp. 568, 578) & fig. Fig. 129D (p. 579).
PF 2076 Dorsal spine. Desc. (p. 568).
PF 2077 Dorsal spine. Desc. (pp. 568, 578) & fig. Fig. 129A (p. 579).
PF 2078–PF 2081 Dorsal spine. Desc. (p. 568).
PF 2082 Dorsal spine. Desc. (p. 568, 577) & fig. Fig. 129F (p. 579).
PF 2083–PF 2085 Dorsal spine. Desc. (p. 568).

Pteraspis priscillae (Denison, 1953)
= Originally described as *Protaspis priscillae* Denison, 1953.
PF 867 Holotype. Dorsal shield lacking the posterior end and tip of the rostrum.
Early Devonian: Water Canyon Fm.
Utah: Cache County: Near Dry Lake, Wellsville Range, SW¼, Sec. 29, T10N, R1W, Locality I.
Collectors: Robert H. Denison, William D. and Priscilla F. Turnbull, July 1950.
Denison, Robert H. 1953. Early Devonian fishes from Utah. Part II. Heterostraci. Fieldiana: Geology, 11(7): 291–355. Desc. (pp. 333, 348–349) & fig. Fig. 82 (p. 346), fig. 83 (p. 347).

Order **CARDIPELTIDA** Tarlo, 1962
Family **CARDIPELTIDAE** Bryant, 1933

Cardipeltis bryanti Denison, 1966
PF 3905 Holotype. Dorsal disc (inner side).
Early Devonian: Beartooth Butte Fm.
Wyoming: Big Horn County: NE¼, Sec. 4, T56N, R93W, south side of Cottonwood Canyon.
Collectors: Robert H. Denison and O. L. Gilpin, Wyoming Expedition, 1963.
Denison, Robert H. 1966. *Cardipeltis* an Early Devonian agnathan of the order Heterostraci. Fieldiana: Geology, 16(4): 89–116. Desc. (pp. 95–96) & fig. Fig. 2 (p. 95).
Paratypes:
PF 3883 Dorsal disc showing inner surface. Desc. (p. 95).
PF 3884 Dorsal disc showing inner surface. Desc. (p. 95).
PF 3895 Dorsal disc exposed on the inner surface. Desc. (p. 95) & fig. Fig. 2 (p. 95), fig. 7 (p. 102).

Cardipeltis richardsoni Denison, 1966
PF 3902 Holotype. Dorsal disc exposed on the outer side.
Early Devonian: Beartooth Butte Fm.
Wyoming: Bighorn County: On the west flank of the Bighorn Mountains, south side of Cottonwood Canyon, SE¼, NE¼, Sec. 4, T56N, R93W.
Collectors: Robert H. Denison and O. L. Gilpin, Wyoming Expedition, 1963.
Denison, Robert H. 1966. *Cardipeltis* an Early Devonian agnathan of the order Heterostraci. Fieldiana: Geology, 16(4): 89–116. Desc. (pp. 93–94) & fig. Fig. 1 (p. 94).
Paratypes:
PF 3790 Dorsal disc, inner side. Desc. (p. 93).
PF 3886 Dorsal disc, inner side. Desc. (p. 93).

PF 3890–PF 3892 Dorsal disc, inner side. Desc. (p. 93).
PF 3893 Incomplete dorsal disc, external side. Desc. (p. 93).
PF 3896 Dorsal disc, inner side. Desc. (p. 93).
PF 3897 Nearly complete articulated specimen. Desc. (p. 93) & fig. Fig. 3 (p. 97), fig. 9 (p. 107).
PF 3899 Dorsal disc, inner side. Desc. (p. 93) & fig. Fig. 4 (p. 99).
PF 3903–PF 3904 Dorsal disc, inner side. Desc. (p. 93).

Cardipeltis wallacii Branson & Mehl, 1931
= Originally described as *Cardipeltis oblongus* Bryant, 1933.
PF 4908 Cast of holotype for *Cardipeltis oblongus* Bryant, 1933. Original at Princeton University, No. 13514. Dorsal shield.
Early Devonian: Beartooth Butte Fm.
Wyoming: Park County: Beartooth Butte.
Collector: Erling Dorf, 1932.
Bryant, William L. 1933. The fish fauna of Beartooth Butte, Wyoming. Proceedings of the American Philosophical Society, 72: 285–314. Desc. (pp. 310–312) & fig. Fig. 7 (p. 311), pl. 19.

Cardipeltis wallacii Branson & Mehl, 1931
= Originally described as *Cardipeltis sinclairi* Bryant, 1933.
PF 4909 Cast of holotype for *Cardipeltis sinclairi* Bryant, 1933. Original at Princeton University, No. 13515. Dorsal shield.
Early Devonian: Beartooth Butte Fm.
Wyoming: Park County: Beartooth Butte.
Collector: Erling Dorf, 1932.
Bryant, William L. 1933. The fish fauna of Beartooth Butte, Wyoming. Proceedings of the American Philosophical Society, 72: 285–314. Desc. (pp. 308–310) & fig. Fig. 6 (p. 309), pl. 18.

Cardipeltis wallacii Branson & Mehl, 1931
PF 5365 Cast of cotype. Original at University of Missouri, No. UM 601 VP D.1.4. Dorsal shield impression.
Early Devonian: Water Canyon Fm.
Utah: Cache County: Blacksmith Fork, about 12 mi SE of Logan.
Branson, E. B., and M. G. Mehl. 1931. Fishes of the Jefferson Formation of Utah. Journal of Geology, 39(6): 509–531. Desc. (pp. 517–523) & fig. Pl. 2, figs. 1–6; fig. 2 (p. 522).

Subclass **THELODONTI**
Order **TURINIIDA** Obruchev, 1967
Family **TURINIIDAE** Obruchev, 1964

Turinia pagei (Powrie, 1869)
= Originally described as *Cephalopterus pagei* Powrie, 1869.
PF 5592 Cast of holotype. Original at Royal Scottish Museum, Edinburgh, No. 1891.-92.133.
Early Devonian: Lower Old Red Sandstone.
United Kingdom: Scotland: Angus, Turin Hill.
Powrie, J. 1869. On the earliest known vestiges of vertebrate life; being a description of the fish remains of the Old Red Sandstone of Forfarshire. Transactions Edinburgh Geological Society, 1(3): 284–301. Desc. (p. 286) & fig. Pl. 14, fig. 16 (p. 289).

Superclass **GNATHOSTOMATA** Gegenbaur, 1874

Class **ELASMOBRANCHIOMORPHI**
Subclass **PLACODERMI** M'Coy, 1848
Order **PTYCTODONTIDA** Gross, 1932
Family **PTYCTODONTIDAE** Woodward, 1891

Ptyctodus eastmani Weller, 1906
UC 11361 Holotype. Tooth.
Early Mississippian: Kinderhook, Glen Park Limestone.
Missouri: Jefferson County: Glen Park.
Collector: Stuart Weller, 1904.
Weller, Stuart. 1906. Kinderhook faunal studies. IV. The fauna of the Glen Park Limestone. Transactions of the Academy of Science of St. Louis, 16: 435–471. Desc. (p. 462) & fig. Pl. 1, figs. 31, 32.

Order **ARTHRODIRA** Woodward, 1891
Suborder **ACTINOLEPINA** Miles, 1973
Family **ACTINOLEPIDAE** Gross, 1940

Aethaspis major Denison, 1958
PF 503 Holotype. Cranial roof.
Early Devonian: Water Canyon Fm.
Utah: Cache County: Cottonwood Canyon, NW¼, Sec. 13, T13N, R3E, Site 6.
Collectors: Robert H. Denison, William D. and Priscilla Turnbull, Field Museum Expedition, July 1950.

Denison, Robert H. 1958. Early Devonian fishes from Utah. Part III. Arthrodira. Fieldiana: Geology, 11(9, publ. #842): 461–551. Desc. (pp. 474–475) & fig. Fig. 89A,B (p. 476).

Paratypes:

PF 300 Fragments of cranial roofs. Desc. (p. 474).

PF 302 Fragments of cranial roofs. Desc. (p. 474).

PF 303 Posterior dorsolateral. Desc. (p. 474) & fig. Fig. 95C (p. 485).

PF 305 Anterior dorsolateral. Desc. (p. 474).

PF 307 Inner surface of anterior dorsolateral plate. Desc. (p. 474).

PF 311 Nearly complete cranial roof. Desc. (p. 474).

PF 313 Fragment of cranial roof. Desc. (p. 474).

PF 314 Type 2 posterior dorsal. Desc. (p. 474).

PF 315 ?Posterior medioventral. Desc. (p. 474) & fig. Fig. 98F (p. 489).

PF 506–PF 507 Fragment of cranial roof. Desc. (p. 474).

PF 514–PF 518 Fragment of cranial roof. Desc. (p. 474).

PF 532 Anterior dorsolateral. Desc. (p. 474) & fig. Fig. 95A (p. 485).

PF 558 Type 2, posterior dorsal. Desc. (p. 474) & fig. Fig. 93A (p. 481).

PF 559 Type 2, posterior dorsal. Desc. (p. 474) & fig. Fig. 93B (p. 481).

PF 560 Anterior lateral. Desc. (p. 474) & fig. Fig. 97A (p. 486).

PF 561 Anterior lateral. Desc. (p. 474) & fig. Fig. 97B (p. 486).

PF 563 Median dorsal. Desc. (p. 474) & fig. Fig. 92B (p. 480).

PF 905–PF 906 Median dorsal. Desc. (p. 474).

PF 907 Median dorsal. Desc. (p. 474) & fig. Fig. 92A, (p. 480).

PF 910 Median dorsal. Desc. (p. 474) & fig. Fig. 92C (p. 480).

PF 911 Median dorsal. Desc. (p. 474).

PF 913 Posterior ventrolateral. Desc. (p. 474) 474) & fig. Fig. 98E (p. 489).

PF 915–PF 918 Fragment of cranial roof. Desc. (p. 474).

PF 919 Fragment of cranial roof. Desc. (p. 474) & fig. Fig. 89C (p. 476).

PF 922 Anterior dorsolateral. Desc. (p. 474) & fig. Fig. 95B (p. 485).

PF 924 Posterior lateral. Desc. (p. 474) & fig. Fig. 98A (p. 489).

PF 925 Anterior lateral. Desc. (p. 474).

PF 939 Anterior ventrolateral, interolateral, spinal. Desc. (p. 474) & fig. Fig. 98B (p. 489).

PF 940 Left anteroventral with parts of interolateral and anterior ventrolateral. Desc. (p. 474) & fig. Fig. 98D (p. 489).

PF 967 Type 2, posterior dorsal. Desc. (p. 474).

PF 968 Posterior ventrolateral. Desc. (p. 474).

PF 971 Anterior dorsolateral. Desc. (p. 474).

PF 983 Incomplete left anterior ventrolateral, interolateral plates. Desc. (p. 474).

PF 988 Incomplete right anterior ventrolateral, interolateral, and anterior ventral plates. Desc. (p. 474).

PF 989 Anterior ventrolateral, anterior ventral, interolateral, and spinal. Desc. (p. 474) & fig. Fig. 98C (p. 489).

PF 990 Left anterior ventral plate. Desc. (p. 474) & fig. Fig. 112D (p. 530).

PF 991 Incomplete anterior ventrolateral, anterior ventral, and interolateral plates. Desc. (p. 474).

PF 994 Interolateral. Desc. (p. 474).

PF 1404 Nearly complete cranial roof. Desc. (p. 474) & fig. Fig. 89B (p. 476).

PF 1635–PF 1636 Fragment of cranial roof. Desc. (p. 474).

Aethaspis ohioensis Denison, 1960

PF 1661 Holotype. Interolateral, spinal and incomplete anterior ventrolateral and a nearly complete cranial roof.

Early Devonian: Holland Quarry Shale.

Ohio: Lucas County: 2.25 mi SSW of Holland, Holland Quarry.

Collector: J. Ernest Carman, 1956.

Denison, Robert H. 1960. Fishes of the Devonian Holland Quarry Shale of Ohio. Fieldiana: Geology, 11(10): 555–613. Desc. (pp. 597–605) & fig. Fig. 142 (p. 599).

Paratypes:

PF 1662 Incomplete impression of a cranial roof. Desc. (pp. 597–598, 600) & fig. Fig. 144 (p. 601).

PF 1663 Median dorsal. Desc. (p. 597) & fig. Fig. 146C (p. 603).

PF 1664 Median dorsal. Desc. (pp. 597, 602) & fig. Fig. 145A (p. 602), fig. 146C (p. 603).

PF 1665 Spinal. Desc. (p. 598).

PF 1666 Anterior lateral. Desc. (p. 597) & fig. Fig. 146A (p. 603).
PF 1667 Anterior ventrolaterals and spinals. Desc. (pp. 598, 604) & fig. Fig. 146D (p. 603).
PF 1668 Anterior ventrolaterals and spinals. Desc. (p. 598) & fig. Fig. 146D (p. 603).
PF 1846 Anterior laterals. Desc. (p. 597).
PF 1847 Posterior ventrolateral. Desc. (p. 598) & fig. Fig. 145F (p. 602), fig. 146B (p. 603).
PF 1848 Anterior ventrolaterals. Desc. (pp. 597–598, 604).
PF 1849 Anterior ventrolaterals. Desc. (pp. 597–598) & fig. Fig. 145E (p. 602).
PF 1850 Incomplete cranial roof, inner side. Desc. (pp. 597, 601).
PF 1851 ? Preorbital. Desc. (p. 598).
PF 1852 Paranuchal, inner side. Desc. (p. 597).
PF 1853 Spinal and ?cranial. Desc. (p. 598).
PF 1854 Undetermined plate. Desc. (p. 598).
PF 1855 Posterior dorsal. Desc. (pp. 597, 604) & fig. Fig. 145C (p. 602).
PF 1856 Posterior dorsal. Desc. (pp. 597, 604) & fig. Fig. 145D (p. 602).
PF 1857 Posterior dorsal. Desc. (pp. 597, 604).

Aethaspis utahensis Denison, 1958
PF 1405 Holotype. Cranial roof.
Early Devonian: Water Canyon Fm.
Utah: Cache County: Blacksmiths Fork, Quarry, Site 1, NE¼, Sec. 3, T10N, R2E.
Collectors: Robert H. Denison, Field Museum of Natural History Expedition, June 1949.
Denison, Robert H. 1958. Early Devonian fishes from Utah. Part III. Arthrodira. Fieldiana: Geology, 11(9, publ. #842): 461–551. Desc. (pp. 475–492) & fig. Fig. 90 (p. 477), fig. 91 (p. 479).
Paratypes:
PF 321 Anterior ventrolateral with attached interolateral, spinal, and anterioventral. Desc. (pp. 475, 487) & fig. Fig. 94E,F (p. 483), fig. 112F (p. 531).
PF 322 Posterior ventrolateral. Desc. (p. 475) & fig. Fig. 94D (p. 483).
PF 964 Incomplete median dorsal. Desc. (p. 475) & fig. Fig. 94A (p. 483).
PF 975 Type 2, posterior dorsals. Desc. (pp. 475, 478, 482).
PF 976 Type 2, posterior dorsals. Desc. (pp. 475, 478, 482) & fig. Fig. 94B (p. 483).
PF 978 Type 2, posterior dorsals. Desc. (p. 475).
PF 1403 Suborbital. Desc. (p. 475) & fig. Fig. 94C (p. 483).
PF 1639 Type 2, posterior dorsals. Desc. (p. 475).

Lataspis rotundicornis (Heintz, 1929)
= Originally described as *Plataspis rotundicornis* Heintz, 1929.
PF 1081 Paratype (formerly Paleontologisk Museum, Oslo B 079). Dorsal shield.
Early Devonian: Lykta Fm., Wood Bay Series.
Spitzbergen: Red Bay.
Heintz, A. 1929. Die downtonischen und devonischen Vertebraten von Spitsbergen. II. Acanthaspida. Skrifter om Svalbard og Ishavet, 22: 1–81. Desc. (p. 61).

Simblaspis cachensis Denison, 1958
PF 504 Holotype. Cranial roof.
Early Devonian: Water Canyon Fm.
Utah: Cache County: Blacksmiths Fork, Site 3, NE¼, Sec. 26, T11N, R2E.
Collectors: Robert H. Denison, William D. and Priscilla F. Turnbull, Field Museum of Natural History Expedition, July 1950.
Denison, Robert H. 1958. Early Devonian fishes from Utah. Part III. Arthrodira. Fieldiana: Geology, 11(9, publ. #842): 461–551. Desc. (pp. 468–474) & fig. Fig. 86A (p. 469), fig. 87 (p. 471), fig. 88C (p. 473).
Paratypes:
PF 301 Incomplete anterior or posterior medioventral, median dorsal. Desc. (p. 468) & fig. Fig. 88A (p. 473).
PF 306 Fragments of cranial roof. Desc. (pp. 468, 470).
PF 308 Fragments of cranial roof. Desc. (pp. 468, 470).
PF 316 Fragments of cranial roof. Desc. (pp. 468, 470).
PF 499 Incomplete cranial roof. Desc. (pp. 468, 470) & fig. Fig. 86B (p. 469).
PF 500 Fragments of cranial roof. Desc. (p. 468).
PF 521 Left marginal. Desc. (p. 468).
PF 562 Left anterior lateral. Desc. (pp. 468, 472) & fig. Fig. 88B (p. 473).
PF 923 Fragment of cranial roof. Desc. (pp. 468, 470).
PF 965 Incomplete median dorsal, anterior and posterior dorsolaterals, fused together. Desc. (pp. 468, 472).

Suborder **PHLYCTAENIINA** Miles, 1973
Family **PHLYCTAENIIDAE** Fowler, 1947

Neophlyctaenius sherwoodi (Denison, 1950)
= Originally described as *Phlyctaenaspis sherwoodi* Denison, 1950.

UF 150 Holotype. Anterior lateral, posterior ventral lateral, and ?posterior medioventral.
Late Devonian: Onteora Fm.
New York: Schoharie County: 3 mi W of Gilboa.
Collector: A. Sherwood.
Denison, Robert H. 1950. A new arthrodire from the New York State Devonian. American Journal of Science, 248: 566–580. Desc. (pp. 566–580) & fig. Pls. 1, 2, fig. 2.

Family **HOLONEMATIDAE** Obruchev, 1933

Holonema haita Denison, 1968
PF 5669 Holotype. Incomplete median dorsal.
Middle Devonian: Jefferson Fm., Basal unit.
Idaho: Lemhi County: At head of Spring Mountain Canyon.
Collector: Mortimer Hait, 1961.
Denison, Robert H. 1968. Middle Devonian fishes from the Lemhi Range of Idaho. Fieldiana: Geology, 16(10): 269–288. Desc. (pp. 282–285) & fig. Fig. 10 (p. 283).

Suborder **COCCOSTEINA** Heintz, 1932
Superfamily **COCCOSTEOIDEA** Denison, 1978
Family **COCCOSTEIDAE** Traquair, 1888

Dickosteus threiplandi Miles & Westoll, 1963
PF 5583 Cast of holotype. Original at Royal Scottish Museum. Head and cheek.
Middle Devonian: Middle Old Red Sandstone, Spital Beds.
Scotland: Caithness: Spital Quarry.
Miles, R. S., and T. S. Westoll. 1963. Two new genera of coccosteid Arthrodira from the Middle Old Red sandstone of Scotland and their stratigraphical distribution. Transactions of the Royal Academy of Edinburgh, 65(9): 179–210. Desc. (pp. 179, 181–185) & fig. Fig. 1A (p. 182), pl. 3, fig. 1.

Superfamily **DINICHTHYOIDEA** Denison, 1978
Family **DINICHTHYIDAE** Newberry, 1885

Dunkleosteus maraisi (Lehman, 1954).
= Originally described as *Dinichthys maraisi* Lehman, 1954.
PF 5411 Cast of holotype. Original at Inst. Paleontologie, Paris. Cranial roof.
Late Devonian: Facies calcaire D/3.
South Morocco: Tafilalet: Hamar Laqhdad, near Erfoucl.
Lehman, Jean Pierre. 1954. Les arthrodires du Maroc meridional (Tafilalet) [abs.]: Int. Geol. Cong., 19th, Algeria, C. R. f. 19 (Union Pal. Int.), p. 123.

Order **ANTIARCHI** Cope, 1885
Family **BOTHRIOLEPIDAE** Cope, 1886

Bothriolepis darbiensis Denison, 1951
PF 396 Holotype. Centro-nuchal plate with part of the right paranuchal and right lateral plates.
Late Devonian: Darby Fm.
Wyoming: Fremont County: South Fork, Little Wind River near Reservoir, SW¼, Sec. 18, T1S, R2W.
Collector: Robert H. Denison, Field Museum Expedition, June 1949.
Denison, Robert H. 1951. Late Devonian fresh-water fishes from the western U.S. Fieldiana: Geology, 11(5): 219–261. Desc. (pp. 233–235) & fig. Fig. 41B (p. 232).
Paratypes:
PF 365–PF 366 Ventral central plate 1. Fig. (only). Fig. 41D (p. 232).
PF 381 Right anteroventrolateral plate. Fig. (only). Fig. 41G (p. 232).
PF 396 Left posteroventrolateral plate. Fig. (only). Fig. 41E (p. 232).
PF 407 Anteromedian-dorsal plate. Fig. (only). Fig. 41F (p. 232).

Subclass **CHONDRICHTHYES** Huxley, 1880
Infraclass **ELASMOBRANCHII** Bonaparte, 1838
Order **CLADODONTIDA**
Family **CLADODONTIDAE** Nicholson & Lydekker, 1889

Cladodus splendens Newberry, 1897
UC 6299 Holotype. Large tooth.
Early Mississippian: Kinderhook.
Published as Burlington, Iowa but the catalogue says LeGrand, Iowa.
Newberry, John Strong. 1897. New species and a new genus of American Palæozoic fishes, together with notes on the genera *Oracanthus, Dactylodus, Polyrhizodus, Sandalodus, Deltodus.* Transactions of the New York Academy of Science, 16: 282–304. Desc. (pp. 284–285) & fig. Pl. 22, fig. 1.

Cladodus vanhornei St. John & Worthen, 1875
UF 739 Holotype. Tooth.
Middle Mississippian: Meramec Group; St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne, 1871.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 273–274) & fig. Pl. 4, fig. 5a–d.

Order **SYMMORIIDA** Zangerl, 1981
Family **STETHACANTHIDAE** Lund, 1974

Stethacanthus altonensis (St. John & Worthen, 1875).
= Originally described as *Physonemus altonensis* St. John & Worthen, 1875.
UC 27404 (later recatalogued as UF 603) Cotype. Large fin-spine.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne, 1871.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (p. 454) & fig. Pl. 19, figs. 1–3.

Stethacanthus compressus Newberry, 1897
UC 6300 Cotypes. Three pectoral spines.
Mississippian: Osage.
Iowa: Des Moines County: Burlington.
Collector: William F. E. Gurley.
Newberry, John Strong. 1897. New species and a new genus of American Palæozoic fishes, together with notes on the genera *Oracanthus, Dactylodus, Polyrhizodus, Sandalodus, Deltodus.* Transactions of the New York Academy of Science, 16: 282–304. Desc. (pp. 292–293) & fig. Pl. 23, figs. 3, 4.

Stethacanthus hamulus (St. John & Worthen, 1875)
= Originally described as *Lambdodus hamulus* St. John & Worthen, 1875.
UC 27334 Holotype. Tooth.
Late Mississippian: Chester Group, Upper Okaw Fm.
Illinois: Randolph County: Chester.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (p. 283) & fig. Pl. 5, fig. 26.

Stethacanthus productus Newberry, 1897
UC 9774 Cotype. Pectoral spine.
Mississippian: Osage, Burlington Limestone.
Illinois: Sagetown.
Collector: William F. E. Gurley.
Newberry, John Strong. 1897. New species and a new genus of American Palæozoic fishes, together with notes on the genera *Oracanthus, Dactylodus, Polyrhizodus, Sandalodus, Deltodus.* Transactions of the New York Academy of Science, 16: 282–304. Desc. (pp. 291–292) & fig. Pl. 23, fig. 1.
Cotype:
UC 9775 Ventral spine. Desc. (pp. 291–292) & fig. Pl. 23, fig. 2.

Family **SYMMORIIDAE** Dean, 1909

Cobelodus aculeatus (Cope, 1894)
= Originally described as *Styptobasis aculeata* Cope, 1894.
UF 576 Holotype. Anterior portion of fish.
Pennsylvanian: Westphalian Upper C or Lower D, Mecca Quarry Shale.
Illinois: Court Creek near Knoxville.
Collector: F. R. Jelliffe.
Cope, Edward Drinker. 1894. New and little known Paleozoic and Mesozoic fishes. Journal of the Academy of Natural Science, Philadelphia, 9(2): 427–448. Desc. (pp. 434–435) & fig. Pl. 20, figs. 1–5.

Denaea meccaensis Williams, 1985
PF 6767 Holotype. Complete skeleton of a male.
Upper Pennsylvanian: Des Moines Series, Lower Wiley Cyclothem, Staunton Fm., Logan Quarry Shale.
Indiana: Parke County: Reserve Twp., Logan Quarry, NE¼, SW¼, Sec. 9, T16N, R8W.
Williams, Michael Eugene. 1985. The "cladodont level" sharks of the Pennsylvanian black shales of central North America. Palaeontographica Abteilung A, 190(3–6): 83–158. Desc. (pp. 88–103, 148–149) & fig. Fig. 3H (p. 90), fig. 8 (p. 96).
Paratypes:
PF 2477 Partial skeleton. Desc. (pp. 148–149) & fig. Fig. 3K (p. 90).

PF 2480 Nearly complete skeleton. Desc. (pp. 100, 148–149, 155) & fig. Pl. 6, fig. 1.

PF 2523 Shoulder girdle and skull. Desc. (pp. 90, 93, 96, 148) & fig. Fig. 3I (p. 90).

PF 2524 Vertebral column with dorsal and pelvic fins. Desc. (pp. 100–103, 148–149, 155) & fig. Fig. 12 (p. 102), pl. 5.

PF 2527 Skeleton. Desc. (pp. 148–149, 155) & fig. Pl. 4, fig. 16.

PF 2528 Partial skeleton. Desc. (pp. 148–149).

PF 2530 Partial skeleton. Desc. (pp. 99, 148–149) & fig. Fig. 10 (p. 99).

PF 2533 Female skeleton. Desc. (pp. 98–102, 148–149) & fig. Fig. 3L (p. 90), fig. 9 (p. 97).

PF 2534 Skeleton. Desc. (pp. 100, 148–149, 155) & fig. Fig. 2 (p. 89), fig. 3F (p. 90), pl. 4, fig. 3.

PF 2539 Skeleton. Desc. (pp. 148–149, 155) & fig. Fig. 3D (p. 90); pl. 4, fig. 19; pl. 4, fig. 15.

PF 2543 Skeleton. Desc. (p. 148).

PF 2561 Ventral lobe of caudal fin. Desc. (p. 148) & fig. Fig. 11A (p. 101).

PF 2568 Ventral lobes of caudal fin. Desc. (p. 148).

PF 2610 Disarticulated elements. Desc. (pp. 148, 150).

PF 2621 Skull and shoulder region. Desc. (pp. 91, 93, 96, 98, 148–149, 155) & fig. Fig. 3G (p. 90); pl. 2, fig. 2; pl. 3, figs. 1–3.

PF 2651 Caudal fin. Desc. (p. 100).

PF 2689 Meckel's cartilage. Desc. (p. 150).

PF 2690 Parts of branchiocranium. Desc. (pp. 98, 148, 150, 155) & fig. Pl. 4, figs. 1, 2.

PF 2709 Complete specimen. Desc. (pp. 92, 98, 100–103, 148, 150) & fig. Fig. 5 (p. 92).

PF 2912 Pelvic cartilage. Desc. (pp. 148–149).

PF 2988 Postcranial elements. Desc. (pp. 148–149).

PF 2989 Meckel's cartilage. Desc. (p. 148).

PF 2991 Meckel's cartilage and hyomandibular. Desc. (pp. 148–149).

PF 2994 Pelvis and caudal fin. Desc. (p. 148).

PF 2995 Male, eject. Desc. (p. 148).

PF 3000 Three Meckel's cartilages. Desc. (p. 148).

PF 3001 Ceratohyal and broken fin rays. Desc. (p. 148).

PF 3118 Two Meckel's cartilages, scapulocoracoid, partial hyomandibular. Desc. (pp. 148, 150).

PF 3119 Anterior portion of small specimen. Desc. (p. 148).

PF 3121 Disarticulated skull and shoulder elements. Desc. (p. 148)

PF 3123 Palatoquadrate. Desc. (p. 148).

PF 3125 Partial skeleton. Desc. (pp. 148, 150).

PF 3126 Spread. Desc. (p. 148).

PF 3127 Meckel's cartilages and 1 palatoquadrate. Desc. (pp. 148, 150).

PF 3128 Branchial skeleton. Desc. (pp. 148, 150).

PF 3129 Partial skeleton. Desc. (p. 148).

PF 3130 Minced elements. Desc. (p. 148).

PF 3131 Meckel's cartilage, palatoquadrate, scapulocoracoid, ceratohyal. Desc. (pp. 148–149).

PF 3132 Isolated elements. Desc. (pp. 148–149).

PF 3133–PF 3137 Meckel's cartilages and ceratohyals. Desc. (pp. 148, 150).

PF 3138 Hyomandibular. Desc. (pp. 148, 150, 155) & fig. Pl. 4, fig. 14.

PF 3139 Meckel's cartilage. Desc. (p. 148).

PF 3140 Meckel's cartilage. Desc. (p. 148).

PF 3141 Meckel's cartilage. Desc. (pp. 148, 150).

PF 3142 Ceratohyal. Desc. (pp. 148, 150).

PF 3143 Meckel's cartilage. Desc. (pp. 148, 150).

PF 3144 Ceratohyal. Desc. (pp. 148, 150) & fig. Pl. 4, fig. 9.

PF 3145 Palatoquadrate. Desc. (pp. 148, 150, 155) & pl. 4, fig. 4.

PF 3146 Meckel's cartilage and ceratohyals. Desc. (pp. 148, 150).

PF 3147 Meckel's cartilage and ceratohyals. Desc. (pp. 148, 150, 155) & pl. 4, fig. 7.

PF 3148 Ceratohyal. Desc. (p. 148).

PF 3149 Meckel's cartilage. Desc. (pp. 148, 150).

PF 3150 Clasper. Desc. (p. 148).

PF 3151 Scapulocoracoid. Desc. (p. 148).

PF 3152 Clasper. Desc. (pp. 100, 148, 155) & fig. Pl. 4, fig. 23.

PF 3153 Meckel's cartilage. Desc. (p. 148).

PF 3154 Scapulocoracoid. Desc. (p. 148).

PF 3155 Clasper. Desc. (pp. 148, 150) & fig. Pl. 4, fig. 22.

PF 3156 Pelvic cartilage. Desc. (pp. 148, 150, 155) & fig. Pl. 4, fig. 21.

PF 3157 Meckel's cartilage. Desc. (pp. 148, 150).

PF 3158 Meckel's cartilage. Desc. (pp. 148, 150).
PF 3159 Palatoquadrate. Desc. (pp. 148, 155) & fig. Pl. 4, fig. 5.
PF 3160 Meckel's cartilage. Desc. (p. 148).
PF 3161 Two scapulocoracoids. Desc. (pp. 148, 155) & fig. Pl. 4, figs. 11, 12.
PF 3162 Dorsal half of scapulocoracoid. Desc. (p. 148).
PF 3163 Meckel's cartilage. Desc. (p. 148).
PF 3164 Isolated cartilages. Desc. (p. 148).
PF 3165 Clasper and scrap cartilage. Desc. (pp. 148, 150).
PF 3166 Partial scapulocoracoid. Desc. (p. 148).
PF 3167 Ceratohyal. Desc. (pp. 148, 150).
PF 3168 Ceratohyal. Desc. (pp. 148, 150).
PF 3169 Scapulocoracoid. Desc. (p. 148).
PF 3170 Hyomandibular. Desc. (pp. 148, 150).
PF 3171 Scapulocoracoid. Desc. (p. 148).
PF 3172 Scapulocoracoid. Desc. (p. 148).
PF 3173 Partial scapulocoracoid and hyomandibular. Desc. (pp. 148, 150).
PF 3174–PF 3178 Meckel's cartilage. Desc. (p. 148).
PF 3179 Scapulocoracoid. Desc. (p. 148).
PF 3180 Ceratohyal and scrap cartilage. Desc. (p. 148).
PF 3182 Meckel's cartilage. Desc. (pp. 148–149).
PF 6435 Spread of teeth. Desc. (pp. 94, 147) & fig. Figs. 7, 18–22 (p. 95).
PF 6477 Spread of teeth. Desc. (p. 147).
PF 6479 Spread of teeth. Desc. (p. 147).
PF 6489 Skull and branchial arches. Desc. (p. 147).
PF 6491 Spread of teeth. Desc. (p. 147).
PF 6502 Spread of teeth. Desc. (p. 147).
PF 6508 Partial skull. Desc. (p. 147).
PF 6518 Spread of teeth. Desc. (p. 147).
PF 6573 Hyomandibular and partial branchial region. Desc. (pp. 147, 149).
PF 6735 Skull. Desc. (p. 148).
PF 7348 Partial skeleton. Desc. (pp. 100, 148, 150, 155) & fig. Fig. 11B (p. 101), pl. 4, figs. 17, 18.
PF 7368 Scapulocoracoid. Desc. (p. 148).
PF 7369 Hyomandibular. Desc. (pp. 150, 155) & fig. Pl. 4, fig. 13.
PF 7370 Ceratohyal. Desc. (pp. 148, 150).
PF 7371 Pelvic cartilage. Desc. (pp. 148, 150).
PF 7372 Ceratohyal. Desc. (pp. 148, 150).
PF 7373 Hyomandibular. Desc. (pp. 148, 150).
PF 7374 Meckel's cartilage. Desc. (pp. 148, 150).
PF 7375 Meckel's cartilage. Desc. (p. 148).
PF 7376 Ceratohyal. Desc. (p. 148).
PF 7377 Meckel's cartilage. Desc. (pp. 148, 150).
PF 7378 Meckel's cartilage. Desc. (p. 148).
PF 7379 Meckel's cartilage. Desc. (p. 148).
PF 7380 Ceratohyal. Desc. (p. 148).
PF 7381–PF 7383 Meckel's cartilage. Desc. (p. 148).
PF 7384–PF 7386 Meckel's cartilage. Desc. (pp. 148, 150).
PF 7387 Meckel's cartilage. Desc. (p. 148).
PF 7388 Meckel's cartilage. Desc. (pp. 148, 150).
PF 7389 Meckel's cartilage. Desc. (pp. 148, 150, 155) & fig. Pl. 4, fig. 6.
PF 7390 Scapulocoracoid. Desc. (p. 148).
PF 7391 Clasper. Desc. (p. 148).
PF 7392 Ceratohyal. Desc. (pp. 148, 150, 155) & fig. Pl. 4, fig. 10.
PF 7393 Hyomandibular. Desc. (pp. 148, 150).
PF 7394 Clasper. Desc. (p. 148).
PF 7395 Meckel's cartilage. Desc. (p. 148).
PF 7396 Hyomandibular. Desc. (pp. 148, 150).
PF 7397 Meckel's cartilage. Desc. (p. 148).
PF 7398 Clasper. Desc. (p. 148).
PF 7399 Scapulocoracoid. Desc. (p. 148).
PF 7400 Meckel's cartilage and ceratohyal. Desc. (pp. 148, 150, 155) & fig. Pl. 4, fig. 8.
PF 7401 Meckel's cartilage. Desc. (p. 148).
PF 7402 Palatoquadrate. Desc. (p. 148).
PF 7403 Meckel's cartilage. Desc. (pp. 148, 150).
PF 7404 Meckel's cartilage. Desc. (p. 148).
PF 7405 Scapulocoracoid. Desc. (p. 148).
PF 7406 Meckel's cartilage. Desc. (pp. 148, 150).
PF 7407–PF 7409 Meckel's cartilage. Desc. (p. 148).
PF 7412 Pelvic cartilage. Desc. (pp. 148, 150, 155) & fig. Pl. 4, fig. 20.
PF 7413 Meckel's cartilage. Desc. (p. 148).
PF 7414 Clasper. Desc. (p. 148).
PF 7415 Pelvic cartilage. Desc. (pp. 148, 150).
PF 7416 Scapulocoracoid and clasper. Desc. (p. 148).
PF 7417 Two Meckel's cartilages, 2 cerato-

hyals, 1 scapulocoracoid, and teeth. Desc. (p. 148).

PF 7418 Two scapulocoracoids. Desc. (p. 148).

PF 7419 Two ceratohyals and 1 Meckel's cartilage. Desc. (p. 148).

PF 7420 Meckel's cartilage. Desc. (p. 148).

PF 7428 Meckel's cartilage. Desc. (p. 148).

PF 7429 Skull and branchial elements. Desc. (pp. 92–93, 148–149, 155) & fig. Fig. 3C (p. 90), Pl. 1, fig. 2.

PF 7431 Skeleton. Desc. (pp. 148–149) & fig. Fig. 3E (p. 90).

PF 7432a Skull. Desc. (pp. 148–149) & fig. Fig. 3J (p. 90).

PF 7433 Skull and miscellaneous cartilages. Desc. (p. 148).

PF 7434 Two claspers and partial pelvic metapterygium. Desc. (pp. 148–149).

PF 7435 Partial skeleton, male. Desc. (p. 148).

PF 7436 Skull and shoulder region. Desc. (p. 149).

PF 7439 Spread of teeth. Desc. (p. 147).

PF 7440 Spread of teeth. Desc. (pp. 94, 147) & fig. Figs. 7, 1–9 (p. 95).

PF 8013 Partial skeleton. Desc. (pp. 92–93, 148–149, 155) & fig. Pl. 1, fig. 1, fig. 3B (p. 90).

PF 8014 Partial skeleton. Desc. (pp. 148–149).

PF 8015 Meckel's cartilage. Desc. (p. 148).

PF 8016 Meckel's cartilage and ceratohyal. Desc. (pp. 148–149).

PF 8017 Scapulocoracoid. Desc. (p. 148).

PF 8018 Partial skeleton. Desc. (p. 148).

PF 8019 Meckel's cartilage, clasper. Desc. (pp. 148–149).

PF 8020 Two mutilated claspers. Desc. (p. 149).

PF 8021 Skull and shoulder girdle. Desc. (p. 149).

PF 8022 Partial visceral skeleton. Desc. (p. 149).

PF 8023 Meckel's cartilage. Desc. (p. 149).

PF 8025 Meckel's cartilage and scapulocoracoid. Desc. (p. 149).

PF 8033 Meckel's cartilage and ceratohyal. Desc. (pp. 148–149).

PF 8034 Pectoral fins. Desc. (p. 148).

PF 8035 Pelvic cartilage. Desc. (pp. 148–149).

PF 8036 Meckel's cartilage. Desc. (pp. 148–149).

PF 8037 Pelvic metapterygium. Desc. (p. 148).

PF 8038 Meckel's cartilage. Desc. (pp. 148–149).

PF 8040 Anterior end of Meckel's cartilage. Desc. (p. 148).

PF 8041 Meckel's cartilage. Desc. (pp. 148–149).

PF 8043 Clasper. Desc. (p. 148).

PF 8044 Meckel's cartilage and scapulocoracoid. Desc. (p. 148).

PF 8045 Pelvic cartilage. Desc. (p. 148).

PF 8085 Ventral lobe of caudal fin. Desc. (p. 149).

PF 8124 Braincase. Desc. (pp. 91–93, 147, 155) & fig. Fig. 3A (p. 90); Pl. 2, fig. 1.

PF 8266 Meckel's cartilage. Desc. (pp. 149, 150).

PF 8519 Tail with epichordal lobe. Desc. (pp. 100–101, 149) & fig. Pl. 6, fig. 2.

Symmorium reniforme Cope, 1893

UF 574 Holotype. Anterior portion of fish.

Pennsylvanian: Westphalian Upper C or Lower D, Mecca Quarry shale.

Illinois: Knox County: Near Galesburg: Court Creek.

Cope, Edward Drinker. 1893. On *Symmorium* and the position of the cladodont sharks. American Naturalist, 27: 999–1001.

Order **EUSELACHII** Hay, 1902

Suborder **CTENACANTHOIDEI**

Superfamily **CTENACANTHOIDEA** Zangerl, 1981

Family **CTENACANTHIDAE** Dean, 1909

Ctenacanthus depressus Newberry, 1897

UC 6302 Holotype. Fin spine.

Early Mississippian: Kinderhook.

Iowa: Marshall County: Le Grand.

Collector: William F. E. Gurley.

Newberry, John Strong. 1897. New species and a new genus of American Palæozoic fishes, together with notes on the genera *Oracanthus, Dactylodus, Polyrhizodus, Sandalodus, Deltodus.* Transactions of the New York Academy of Science, 16: 282–304. Desc. (p. 291) & fig. Pl. 228, fig. 6.

Ctenacanthus gurleyi Newberry, 1897

UC 6301 Cotype. Fragments of fin spines.

Middle Mississippian: Meramec, St. Louis Limestone.

Indiana: Washington County: Salem.
Collector: William F. E. Gurley.
Newberry, John Strong. 1897. New species and a new genus of American Palæozoic fishes, together with notes on the genera *Oracanthus, Dactylodus, Polyrhizodus, Sandalodus, Deltodus.* Transactions of the New York Academy of Science, 16: 282–304. Desc. (p. 290).

Superfamily **CTENACANTHOIDEA** Zangerl, 1981, *Incertae sedis*

Asteroptychius sancti-ludovici St. John & Worthen, 1875
UC 27244 Cotype. Portion of spine.
Middle Mississippian: Meramec Group, St. Louis Limestone, "Lower Caro".
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 437–438) & fig. Pl. 16, figs. 3, 4.

Family **BANDRINGIDAE** Zangerl, 1969

Bandringa herdinae Zangerl, 1979
PF 8442 Holotype. A nearly complete specimen in lateral burial position, lacking the tail and tip of the rostrum; both halves of a concretion.
Pennsylvanian: Westphalian upper C, or lower D, Carbondale Fm., Francis Creek Shale, Braidwood concretion fauna.
Illinois: Grundy County: Peabody Coal Company, Pit 1 or 6.
Collector: Jerry Herdina.
Zangerl, Rainer. 1979. New Chondrichthyes from the Mazon Creek fauna (Pennsylvanian) of Illinois, pp. 449–500. *In* Nitecki, Matthew H, ed. Mazon Creek Fossils. Academic Press, New York, N.Y., 581 pp. Desc. (pp. 489–497) & fig. Fig. 9A,B (p. 493), fig. 10F (p. 494).
Paratypes:
PF 8436 Most of a specimen in side position, lacking tail and part of head. Desc. (p. 490) & fig. Fig. 10E (p. 494).
PF 8439 Specimen lacking tip of rostrum and tail; head in dorsoventral burial position, body lateral. Desc. (pp. 490, 495–496) & fig. Fig. 10D (p. 494).
PF 8540 Very tiny specimen, complete except for tip of the rostrum. Desc. (pp. 490, 496) & fig. Fig. 10B (p. 494).
PF 8541 Part of a specimen with head in dorsoventral burial position, body lateral. Desc. (pp. 490–491, 494–496) & fig. Fig. 9C (p. 493), fig. 10C (p. 494).
PF 8542 Very tiny specimen, incomplete at both ends. Desc. (pp. 490, 496) & fig. Fig. 10A (p. 494).

Bandringa rayi Zangerl, 1969
PF 5686 Holotype. Juvenile long-snouted specimen, part and counterpart.
Pennsylvanian: Westphalian, Carbondale Fm., Francis Creek Shale, Essex concretion fauna.
Illinois: Will County: Peabody Coal Company, Area 3 of Pit 11, SW¼, Sect. 32, T32N, R9E.
Collector: Ray Bandringa, Jr., 1967.
Zangerl, Rainer. 1969. *Bandringa rayi* a new ctenacanthoid shark from the Pennsylvanian Essex fauna of Illinois. Fieldiana: Geology, 12(10); 157–169. Desc. (pp. 157–169) & fig. Fig. 84 (p. 158), fig. 85 (p. 159), fig. 86 (p. 160), fig. 87 (p. 162), fig. 88 (p. 164), fig. 89D (p. 165).

Family **PHOEBODONTIDAE** Williams, 1979

Phoebodus heslerorum Williams, 1985
PF 8170 Holotype. Disarticulated skull, partial pectoral fin, and both dorsal spines.
Pennsylvanian: Westphalian Upper C, Des Moines Series, Linton Fm., Liverpool Cyclothem, Mecca Quarry Shale.
Indiana: Parke County: Wabash Twp., 2000 ft N of SW corner of Sec. 18, T15N, R8W, Mecca Quadrangle, Hesler Quarry, on property of Mr. and Mrs. Bennie Hesler.
Collectors: Rainer Zangerl, Orville Gilpin, and Michael Eugene Williams, Sept. 18, 1973.
Williams, Michael Eugene. 1985. The "cladodont level" sharks of the Pennsylvanian black shales of central North America. Palaeontographica Abteilung A, 190(3–6): 83–158. Desc. (pp. 124–131, 154, 158) & fig. Fig. 22 (p. 126); pl. 16, figs. 5, 6, 9.
Paratypes:
PF 2440 Head and shoulder region and 1st

dorsal spine. Desc. (pp. 127, 129–130, 154, 158) & fig. Fig. 23B, (p. 128); pl. 16, fig. 7; pl. 17, figs. 10–12.
PF 2465 First dorsal spine. Desc. (p. 154).
PF 2473 First dorsal spine. Desc. (pp. 130, 154, 158) & fig. Pl. 17, figs. 6, 7.
PF 2552 First dorsal spine. Desc. (p. 154).
PF 2675 First dorsal spine plus partial cartilage. Desc. (pp. 154, 158) & fig. Pl. 17, fig. 9.
PF 2676 First dorsal spine. Desc. (p. 154).
PF 2679 Spine. Desc. (p. 154).
PF 2682 First dorsal spine. Desc. (p. 154).
PF 2685 First dorsal spine plus partial cartilage. Desc. (pp. 154, 158) & fig. Pl. 17, fig. 8.
PF 2686 First dorsal spine plus partial cartilage. Desc. (p. 154).
PF 2697 First dorsal spine. Desc. (pp. 153–154).
PF 2757 Tooth. Desc. (p. 154).
PF 3120 First dorsal spine. Desc. (p. 154).
PF 6437 First dorsal spine. Desc. (p. 154).
PF 6478 Second dorsal spine. Desc. (pp. 130, 150, 154, 158) & fig. Pl. 17, fig. 3.
PF 8171 First dorsal spine. Desc. (p. 154) & fig. Pl. 17, fig. 4.
PF 8172 First dorsal spine. Desc. (p. 154).
PF 8175 Second dorsal spine. Desc. (pp. 154, 158) & fig. Pl. 17, fig. 5.
PF 8176 Spine. Desc. (p. 154).
PF 8177 First dorsal spine. Desc. (p. 154).
PF 8178 Dorsal half of spine. Desc. (p. 154).
PF 8180 Tooth. Desc. (pp. 154, 158) & fig. Pl. 16, figs. 1, 3.
PF 8181 First dorsal spine. Desc. (pp. 130, 154).
PF 8183 First dorsal spine, partial 2nd dorsal spine, scales and a few teeth. Desc. (pp. 130, 154, 158) & fig. Pl. 17, fig. 2.
PF 8186 Tooth. Desc. (p. 154).
PF 8187 Skull. Desc. (pp. 129, 154).
PF 8190 First dorsal spine. Desc. (pp. 130, 154, 158) & fig. Pl. 17, fig. 1.
PF 8191 Dorsal half of spine. Desc. (pp. 130, 154).
PF 8212 Jaws and partial branchial skeleton. Desc. (pp. 127, 129, 154, 158) & fig. Fig. 23A (p. 128).
PF 8242 Tooth. Desc. (p. 154, 158) & fig. Pl. 16, Fig. 8.
PF 8318 Tooth. Desc. (p. 154).
PF 8321 Tooth. Desc. (p. 154).
PF 8322 Tooth. Desc. (pp. 154, 158) & fig. Pl. 16, Figs. 2, 4.
PF 8323 Tooth. Desc. (p. 154).
PF 8325 Tooth. Desc. (p. 154).
PF 8518 Skull. Desc. (pp. 129, 154) & fig. Fig. 23C (p. 128).

Rhombacanthus zangerli Williams, 1985
= Most likely a phoebodontid. Rainer Zangerl, pers. comm., Nov. 10, 1989.
PF 2629 Holotype. Spine and portion of squamation of body, including parts of lateral line.
Pennsylvanian: Westphalian Upper C, Des Moines Series, Lower Wiley Cyclothem, Staunton Fm., Logan Quarry Shale.
Indiana: Parke County: Reserve Twp., Logan Quarry, NE¼, SW¼, Sec. 9, T16N, R8W.
Collectors: Rainer Zangerl and Eugene S. Richardson, Jr., 1957–1958.
Williams, Michael Eugene. 1985. The "cladodont level" sharks of the Pennsylvanian black shales of central North America. Palaeontographica Abteilung A, 190(3–6): 83–158. Desc. (pp. 84, 131–132, 158) & fig. Pl. 18, figs. 1, 6, 7.
Paratype:
PF 2670 Partial spine and scales. Desc. (p. 131).

Suborder **CTENACANTHOIDEI,** *Incertae sedis*

Bythiacanthus vanhornei St. John & Worthen, 1875
UC 27429 Holotype. Spine.
Middle Mississippian: Meramec Group, Upper St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488, Desc. (pp. 445–446) & fig. Pl. 17, fig. 1.

Lambdodus transversus St. John & Worthen, 1875
UC 27333 Holotype. Tooth.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (p. 282) & fig. Pl. 5, fig. 4.

Physonemus reversus (St. John & Worthen, 1875)
= Originally described as *Drepanacanthus reversus* St. John & Worthen, 1875.
UC 27323 Cotype. Fragmentary spine, 2 pieces.
Middle Mississipian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (p. 456) & fig. Pl. 19, figs. 5, 6.

Note: UF 617, is it the same specimen as UC 27323? One fragment is labeled UC 27323. UC 27323 is suppose to be in two pieces. One fragment is labeled UF 617.

Suborder **HYBODONTOIDEI**
Suborder **HYBODONTOIDEI,** *Incertae sedis*

Trichorhipis praecursor Zangerl, 1973
PF 5729 Holotype. Pectoral fin in one-half of one concretion.
Middle Pennsylvanian: Carbondale Fm., Francis Creek Shale Member.
Illinois: Grundy County: Mazon Creek.
Collector: Wilson N. Stewart, 1968.
Zangerl, Rainer. 1973. Interrelationships of early chondrichthyans, pp. 1–14. *In* Greenwood, P. H., R. S. Miles, and Colin Patterson, eds. Supplement 1 to the Zoological Journal of the Linnean Society, Vol. 53. Academic Press, Inc., London, United Kingdom. 536 pp. Desc. (p. 13) & fig. Pl. 1.

Superfamily **HYBODONTOIDEA** Zangerl, 1981

Dabasacanthus inskasi Zangerl, 1979
PF 8546 Holotype. Nearly entire specimen of a very young individual, lacking the tail fin, preserved in lateral position.
Pennsylvanian: Westphalian Upper C, or Lower D, Carbondale Fm., Francis Creek Shale, Essex concretion fauna.
Illinois: Will County: Peabody Coal Company, Pit 11, SW¼, Sec. 5, T32N, R9E.
Collector: Walter Dabasinskas.
Zangerl, Rainer. 1979. New Chondrichthyes from the Mazon Creek Fauna (Pennsylvanian) of Illinois, pp. 449–500. *In* Nitecki, Matthew H., ed., Mazon Creek Fossils. Academic Press, New York, N.Y., 581 pp. Desc. (pp. 482–489) & fig. Fig. 7 (p. 484), fig. 8 (p. 485).

Order **XENACANTHIDA** Glikman, 1964
Family **TAMIOBATIDAE** Hay, 1902

Tamiobatus vetustus Eastman, 1897
= *Tamiobatus* is most likely a xenacanthid; it is definitely not a symmoriid. Rainer Zangerl, Nov. 10, 1989, pers. comm.
PF 5414 Cast of holotype. Original at Smithsonian, cast of USNM 1717. Cast of braincase.
Early Mississippian.
Kentucky: Eastern part of Powell County.
Eastman, C. R. 1897. *Tamiobatus vetustus,* a new form of fossil skate. American Journal of Science, 4(4): 85–90. Desc. (pp. 85–90).

Family **XENACANTHIDAE** Fritsch, 1889

Xenacanthus compressus (Newberry, 1856)
= Originally described as *Orthacanthus quadriseriatus* Cope, 1877.
UC 6502 Holotype for *Orthacanthus quadriseriatus* Cope, 1877. Fragments of head spine.
Pennsylvanian: Early Conemaugh, Middle McLeansboro Fm.
Illinois: Vermilion County: Horseshoe Bend of Vermilion River.
Collector: William F. E. Gurley.
Cope, Edward Drinker. 1877. Descriptions of extinct Vertebrata from the Permian and Triassic formations of the United States. Proceedings of the American Philosophical Society, 17: 182–193. Desc. (p. 192). No figure.

Xenacanthus priscus (Eastman, 1899)
= Originally described as *Diplodus priscus* Eastman, 1899.
UF 141 (formerly part of UC 7491) Cotype for *Diplodus priscus* Eastman, 1899. Tooth.
Mississippian: Fissure fill.
Illinois: Du Page County: Quarry 1 mi W of Elmhurst Railroad Station.
Collector: Stuart Weller.
Eastman, C. R. 1899. Descriptions of new species of *Diplodus* teeth from the Devonian of northeastern Illinois. Journal of Geology, 7(5): 489–493. Desc. (p. 490) & fig. Pl. 7, fig. 1.

Cotype:
UF 142 (formerly part of UC 7491) Tooth. Desc. (p. 489) & fig. Pl. 7, fig. 2.

Xenacanthus striatus (Eastman, 1899)
= Originally described as *Diplodus striatus* Eastman, 1899
UF 139 Cotype. Tooth.
Mississippian: Fissure fill.
Illinois: Du Page County: Quarry 1 mi W of Elmhurst Railroad Station.
Collector: Stuart Weller.
Eastman, C. R. 1899. Descriptions of new species of *Diplodus* teeth from the Devonian of northeastern Illinois. Journal of Geology, 7(5): 489–493. Desc. (pp. 490–491) & fig. Pl. 7, fig. 3.
Cotype:
UF 140 Tooth. Desc. (pp. 489–490) & fig. Pl. 7, fig. 4.

Order **EUGENEODONTIDA** Zangerl, 1981
Suborder **CASEODONTOIDEI**
Superfamily **CASEODONTOIDEA** Zangerl, 1981
Family **CASEODONTIDAE** Zangerl, 1981

Caseodus basalis (Cope, 1894)
= Originally described as *Orodus basalis* (Cope, 1894).
UF 575 Holotype. Anterior half of fish. Cope specimen No. 2.
Pennsylvanian.
Illinois: Knox County: Near Galesburg.
Collector: F. R. Jelliffe.
Cope, Edward Drinker. 1894. New and little known Paleozoic and Mesozoic fishes. Journal of the Academy of Natural Sciences, 9(2): 427–448. Desc. (pp. 432–443) & fig. Pl. 18, figs. 6, 7.

Caseodus eatoni Zangerl, 1981
PF 2520 Holotype. Partially articulated skeleton.
Pennslyvanian: Westphalian Upper C or Lower D, Des Moines Series, Staunton Fm., Lower Wiley Cyclothem, Logan Quarry Shale, Level J.
Indiana: Parke County: Reserve Twp., NE¼, SW¼, Sec. 9, T16N, R8W.
Zangerl, Rainer. 1981. Chondrichthyes 1. Paleozoic Elasmobranchii, vol. 3A. 115 pp. + 116 figs. *In* Schultze, Hans-Peter, ed., Handbook of Paleoichthyology. Gustav Fischer Verlag, Stuttgart. Desc. (p. 79) & fig. Fig. 90 (p. 80).

Ornithoprion hertwigi Zangerl, 1966
PF 2710 Holotype. Skull and shoulder.
Pennsylvanian: Allegheny, Linton Fm., Mecca Quarry Shale, Grid 14 A3.4 (#6). X-ray number Q55.
Indiana: Parke County: Mecca Quarry, Wabash Twp., SW¼, NE¼, Sec. 29, T15N, R8W.
Collectors: Rainer Zangerl and Eugene S. Richardson, Jr., 1954.
Zangerl, Rainer. 1966. A new shark of the family Edestidae, *Onithoprion hertwigi* from the Pennsylvanian Mecca and Logan Quarry shales of Indiana. Fieldiana: Geology, 16(1): 1–43. Desc. (pp. 10–43) & fig. Fig. 1 (p. 4), fig. 2 (p. 5), fig. 3 (p. 7), fig. 7 (p. 14), fig. 10 (p. 20), fig. 11 (p. 21), fig. 12A (p. 22).
Paratypes:
PF 2656 Partial skull. Desc. (p. 11) & fig. Fig. 17 (p. 27), fig. 22 (p. 32).
PF 2707 Skull and shoulder. Desc. (p. 10) & fig. Fig. 8 (p. 15).
PF 2780 Skull, teeth, fin rays. Desc. (p. 11) & fig. Fig. 4 (p. 8), fig. 5A (p. 9), fig. 15A,B (p. 25).
PF 2824 Skull. Desc. (p. 11).
PF 2903 Cartilage elements and some teeth, on plate and counterplate. Desc. (p. 11) & fig. Fig. 14 (p. 24), fig. 18 (p. 28), fig. 19 (p. 29), fig. 20 (p. 30), fig. 21 (p. 31), fig. 23 (p. 35), fig. 24 (p. 36), fig. 25 (p. 37).
PF 2908 Skull. Desc. (p. 11) & fig. Fig. 9 (p. 17), fig. 13B (p. 23).
PF 2923 Skull. Desc. (p. 10) & fig. Fig. 5B (p. 9), fig. 6 (p. 13), fig. 13A (p. 23).

Romerodus orodontus Zangerl, 1981
PF 8522 Holotype. Anterior half of an articulated specimen in dorsoventral burial position, showing the skull, mandible, shoulder girdle, and pectoral fins in ventral view.
Pennsylvanian: Westphalian D, Missouri Series, Bronson Group, Dennis Fm., Stark Shale.
Nebraska: La Platte: Hansen Quarry.
Collector: W. D. White.
Zangerl, Rainer. 1981. Chondrichthyes 1. Paleozoic Elasmobranchii, vol. 3A. 115 pp. + 116 figs. *In* Schultze, Hans-Peter, ed., Handbook of Paleoichthyology. Gustav Fischer Verlag, Stuttgart. Desc. (p. 79) & fig. Fig. 92 (p. 81).
Paratypes:
PF 8523 Skeleton. Desc. (p. 79).
PF 8524 Skeleton. Desc. (p. 79) & fig. Fig. 92 (p. 81).

PF 8525 Skeleton. Desc. (p. 79).
PF 8526 Skeleton. Desc. (p. 79) & fig. Fig. 92 (p. 81).
PF 8527–PF 8530 Skeleton. Desc. (p. 79).

Family **EUGENEODONTIDAE** Zangerl, 1981

Bobbodus schaefferi Zangerl, 1981
PF 7292 Holotype. Dentition of the left mandibular ramus.
Pennsylvanian: Stephanian A, Virgilian Series, Shawnee Group, Lecompton Fm., Queen Hill Shale.
Nebraska: Cass County: Plattsmouth, Ace Hill Quarry, Midwest Construction Company, E½, SW¼, SW¼, Sec. 33, T12N, R14E.
Collector: Gerald R. Case.
Zangerl, Rainer. 1981. Chondrichthyes 1. Paleozoic Elasmobranchii, vol. 3A. 115 pp. + 116 figs. *In* Schultze, Hans-Peter, ed., Handbook of Paleoichthyology. Gustav Fischer Verlag, Stuttgart. Desc. (pp. 82–83) & fig. Fig. 96A (p. 84).
Paratype:
PF 8532 Disarticulated portion of a dentition. Desc. (pp. 82–83) & fig. Fig. 97A,B (p. 84).

Eugeneodus richardsoni Zangerl, 1981
PF 2625 Holotype. Skeleton, partially ariculated.
Pennsylvanian: Westphalian Upper C or Lower D, Des Moines Series, Staunton Fm., Logan Quarry Shale, Level J.
Indiana: Parke County: Reserve Twp., Logan Quarry, Montezuma Quadrangle, NE corner of SW¼, Sec. 9, T16N, R8W.
Collectors: Rainer Zangerl and Eugene S. Richardson, Jr., 1957–1958.
Zangerl, Rainer. 1981. Chondrichthyes 1. Paleozoic Elasmobranchii, vol. 3A. 115 pp. + 116 figs. *In* Schultze, Hans-Peter, ed., Handbook of Paleoichthyology. Gustav Fischer Verlag, Stuttgart. Desc. (p. 85) & fig. Fig. 90D (p. 80), fig. 89A (p. 78).
Paratype:
PF 2576 Tail fin. Fig. 89A (p. 78).

Gilliodus orvillei Zangerl, 1981
PF 8535 Holotype. Partially articulated skeleton.
Pennsylvanian: Westphalian Upper C or Lower D, Des Moines Series, Staunton Fm., Lower Wiley Cyclothem, Logan Quarry Shale, Level J.
Indiana: Parke County: Reserve Twp., Logan Quarry, NE¼, SW¼, Sec. 9, T16N, R8W.
Zangerl, Rainer. 1981. Chondrichthyes 1. Paleozoic Elasmobranchii, vol. 3A, 115 pp. + 116 figs. *In* Schultze, Hans-Peter, ed., Handbook of Paleoichthyology. Gustav Fischer Verlag, Stuttgart. Desc. (p. 85) & fig. Fig. 90C (p. 80).
Paratype:
PF 5556 Lateral and symphysial teeth. Fig. (only). Fig. 97G–K (p. 84).

Gilliodus peyeri Zangerl, 1981
PF 2537 Holotype. Braincase, lower jaw and hyoid elements and a spread of teeth including symphysials.
Pennsylvanian: Westphalian Upper C or Lower D, Des Moines Series, Staunton Fm., Lower Wiley Cyclothem, Logan Quarry Shale.
Indiana: Parke County: Reserve Twp., Logan Quarry, NE¼, SW¼, Sec. 9, T16N, R8W.
Collectors: Rainer Zangerl and Eugene S. Richardson, Jr. 1957–1958.
Zangerl, Rainer. 1981. Chondrichthyes 1. Paleozoic Elasmobranchii, vol. 3A. 115 pp. + 116 figs. *In* Schultze, Hans-Peter, ed., Handbook of Paleoichthyology. Gustav Fischer Verlag, Stuttgart. Desc. (p. 85).
Paratype:
PF 8534 Small spread of lateral teeth. Desc. (p. 85) & fig. Fig. 97C,D (p. 84).

Order **ORODONTIDA** Zangerl, 1981
Family **ORODONTIDAE** DeKoninck, 1878

Orodus greggi Zangerl, 1981
PF 2201 Holotype. Articulated skeleton, lacking the posterior abdomen and tail.
Pennsylvanian: Westphalian Upper C, Des Moines Series, Staunton Fm., Lower Wiley Cyclothem, Logan Quarry Shale, Level J.
Indiana: Parke County: Reserve Twp., Logan Quarry, NE¼, SW¼, Sec. 9, T16N, R8W.
Collectors: Rainer Zangerl and Eugene S. Richardson, Jr., 1957–1958.
Zangerl, Rainer. 1981. Chondrichthyes 1. Paleozoic Elasmobranchii, vol. 3A. 115 pp. + 116 figs. *In* Schultze, Hans-Peter, ed., Handbook of Paleoichthyology. Gustav Fischer Verlag, Stuttgart. Desc. (p. 93) & fig. Figs. 103, 104 (p. 92), fig. 105 (p. 93).

Paratype:
PF 2623 Juvenile skeleton. Desc. (p. 93).

Orodus micropterygius Zangerl, 1981
PF 8553 Holotype. Complete skeleton lacking only the dorsal lobe of the caudal fin.
Pennsylvanian: Westphalian Upper C or Lower D, Des Moines Series, Linton Fm., Liverpool Cyclothem, Mecca Quarry Shale.
Indiana: Parke County: Wabash Twp., Hesler Quarry, 2000 ft N of SW corner of Sec. 18, T15N, R8W, on property of Mr. and Mrs. Bennie Hesler.
Collectors: Michael Eugene Williams, Rainer Zangerl, and Orville Gilpin.
Zangerl, Rainer. 1981. Chondrichthyes 1. Paleozoic Elasmobranchii, vol. 3A. 115 pp. +116 figs. *In* Schultze, Hans-Peter, ed., Handbook of Paleoichthyology. Gustav Fischer Verlag, Stuttgart. Desc. (pp. 93–94) & fig. Fig. 106 (p. 94).
Paratypes:
PF 6595 Spread of teeth and lower jaws. Desc. (p. 94) & fig. Fig. 107 (p. 94).
PF 8554 Partially articulated juvenile specimen lacking posterior half of body. Desc. (pp. 93–94).

Orodus neglectus St. John & Worthen, 1875
UC 27355 Holotype. Tooth.
Middle Mississippian: Meramec Group, Pella Beds.
Iowa: Marion County: Pella.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (p. 308) & fig. Pl. 6, fig. 26.

Orodus turgidus St. John & Worthen, 1875
UC 27356 Cotype. Tooth.
Late Mississippian: Chester Group, Upper Okaw Fm.
Illinois: Randolph County: Chester.
Collector: Sir William Cornelius Van Horne.
St. John Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (p. 310) & fig. Pl. 6, fig. 4.

Order **PETALODONTIDA** Zangerl, 1981
Family **PETALODONTIDAE** Newberry & Worthen, 1886

Antliodus gracilis St. John & Worthen, 1875
UC 27424 Holotype. Tooth.
Middle Mississippian: Warsaw Fm.
Illinois: Madison County: Mouth of Piasa Creek near Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 393–394) & fig. Pl. 11, fig. 29.

Chomatodus incrassatus St. John & Worthen, 1875
UC 27256 Holotype. Tooth.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–448. Desc. (pp. 359–360) & fig. Pl. 10, fig. 18.

Ctenoptychius compactus (St. John & Worthen, 1875)
= Originally described as *Harpacodus occidentalis* St. John & Worthen, 1875.
UC 27330 Holotype for *Harpacodus occidentalis* St. John & Worthen, 1875. Tooth.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6:245–488. Desc. (p. 355) & fig. Pl. 10A, fig. 2–2d.

Janassa gurleiana (Cope, 1877)
= Originally described as *Strigilina gurleiana* Cope, 1877.
UC 6501 Holotype. Tooth plate.
Pennsylvanian: Early Conemaugh, Middle McLeansboro Fm.
Illinois: Vermilion County: Horseshoe Bend of Vermilion River.
Collector: William F. E. Gurley.
Cope, Edward Drinker. 1877. Descriptions of extinct Vertebrata from the Permian and Triassic formations of the United States. Proceedings of the American Philosophical Society, 17: 182–193. Desc. (p. 191).

Janassa strigilina Cope, 1877
= Originally described as *Strigilina linguaeformis* Cope, 1877.
UC 6500 Holotype. Tooth plate.
Pennsylvanian: Early Conemaugh, Middle McLeansboro Fm.
Illinois: Vermilion County: Horseshoe Bend of Vermilion River.
Collector: William F. E. Gurley.
Cope, Edward Drinker. 1877. Descriptions of extinct Vertebrata from the Permian and Triassic formations of the United States. Proceedings of the American Philosophical Society, 17: 182–193. Desc. (p. 191).

Lisgodus selluliformis St. John & Worthen, 1875
UC 27336 Cotypes. Three teeth.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 366–367) & fig. Pl. 10A, fig. 16.

Peltodus plicomphalus St. John & Worthen, 1875
UC 27359 Holotype. Incomplete tooth.
Late Mississippian: Chester Group, Upper Okaw Fm.
Illinois: Randolph County: Chester.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 411–412) & fig. Pl. 13, fig. 9.

Peltodus quadratus St. John & Worthen, 1875
UC 27360 Cotypes. Two teeth.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 410–411) & fig. Pl. 3, figs. 6, 7.

Petalodus hybridus St. John & Worthen, 1875
UC 27368 Cotypes. Two teeth.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 394–395) & fig. Pl. 12, fig. 10.

Petalodus linguifer Newberry & Worthen, 1866
UF 10 (formerly UC 10843) Holotype. Tooth.
Late Mississippian: Chester Group.
Illinois: Randolph County: Chester.
Collector: William F. E. Gurley
Newberry, J. S., and Amos H. Worthen. 1866. Descriptions of new species of vertebrates, mainly from the subcarboniferous limestone and coal measures of Illinois. Geological Survey of Illinois, 2: 9–134. Desc. (p. 37) & fig. Pl. 2, figs. 4, 5.

Petalodus ohioensis (Safford, 1851)
= Originally described as *Getalodus ohioensis* Safford, 1851.
PF 673 Casts of holotype. Casts of 3 teeth.
Pennsylvanian.
Ohio: Guernsey County: Near Cambridge.
Collector: J. M. Safford.
Safford, J.M. 1853. Tooth of *Getalodus ohioensis*. American Journal of Science, 2nd ser., 16: 142. Desc. (p. 142) & fig. Figs. 1, 2.

Petalorhynchus distortus St. John & Worthen, 1875
UC 27382 Cotype. Tooth.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Museum Label says: Illinois: Madison County: Alton. (Note: Locality was published as Iowa: Pella.)
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (p. 390–391) & fig. Pl. 12, fig. 7.

Petalorhynchus pseudosaggitatus St. John & Worthen, 1875
UC 27378 Cotype. Tooth.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 405–406) & fig. Pl. 12, figs. 1–4.

Petalorhynchus spatulatus St. John & Worthen, 1875
UC 27374 Cotype. Tooth.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 408–409) & fig. Pl. 12, figs. 5, 6.

Polyrhizodus amplus St. John & Worthen, 1875
UC 27398 Holotype. Tooth.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 387–389) & fig. Pl. 13, fig. 13.

Polyrhizodus concavus (St. John & Worthen, 1875)
= Originally described as *Dactylodus concavus* St. John & Worthen, 1875.
UC 27317 Cotype. Tooth.
Middle Mississippian: Meramec Group, Upper St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossile fishes. Geological Survey of Illinois, 6: 245–488. Desc. (p. 390–391) & fig. Pl. 13, figs. 17, 18.

Tanaodus bellicinctus St. John & Worthen, 1875
UC 27416 Cotypes. Three teeth.
Late Mississippian: Chester Group, Upper Okaw Fm.
Illinois: Randolph County: Chester.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 376–378) & fig. Pl. 11, figs. 14–16, 25.

Tanaodus depressus St. John & Worthen, 1875
UC 27414 Cotypes. Seven teeth.
Late Mississippian: Chester Group, Upper Okaw Fm.
Illinois: Randolph County: Chester.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 378–380) & fig. Pl. 11, figs. 11–13.

Note: May actually be fragments of a chimaerid jaw (Dr. Richard Lund, pers. comm.).

Tanaodus polymorphus St. John & Worthen, 1875
UC 27415 Cotypes. Teeth, fragments.
Late Mississippian: Chester Group, Upper Okaw Fm.
Illinois: Randolph County: Chester.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 380–381) & fig. Pl. 11, figs. 17, 19, 24.

Note: May actually be fragments of a chimaerid jaw (Dr. Richard Lund, pers. comm.).

Tanaodus praenuntius St. John & Worthen, 1875
UC 27412 Cotype. Three teeth.
Middle Mississippian: Meramec Group, Pella Beds.
Iowa: Marion County: Pella.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 371–373) & fig. Pl. 11, figs. 6–10.

Tanaodus pumilis St. John & Worthen, 1875
UC 27410 Cotypes. Two incomplete teeth.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 369–371) & fig. Pl. 11, figs. 1–5.

Tanaodus sculptus St. John & Worthen, 1875
UF 17 (formerly UC 27413) Cotype. Four teeth.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. De-

scription of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 373–375) & fig. Pl. 11, figs. 20–23.

Tanaodus sublunatus St. John & Worthen, 1875
UC 27268 Holotype. Fragment of tooth.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 368–369) & fig. Pl. 11, fig. 27.

Infraclass **SUBTERBRANCHIALIA** Zangerl, 1979
Superorder **HOLOCEPHALI** Bonaparte 1832–1841
Unnamed Order
Family **HELODONTIDAE** Patterson, 1965

Venustodus argutus St. John & Worthen, 1875
UC 27427 Cotypes. Two teeth.
Late Mississippian: Chester Group, Upper Okaw Fm.
Illinois: Randolph County: Chester, Mouth of Piasa Creek near Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 352–353) & fig. Pl. 9, figs. 5, 6.
Cotype:
UC 27428 Two teeth. Desc. (pp. 352–353).

Note: No one knows what *Venustodus* is. It is highly doubtful that it is a holocephalian! (Dr. Rainer Zangerl, pers. comm., Dec. 28, 1984).

Order **BRADYODONTIDA** Woodward, 1921
Suborder **CHIMAEROIDEI**
Family **CHIMAERIDAE** Rafinesque, 1815

Edaphodon barberi Applegate, 1970
PF 290 Holotype. Jaw.
Late Cretaceous: Selma Group, Mooreville Fm.
Alabama: Dallas County: Donald Farm.
Collector: C. M. Barber, Geological Society of America Expedition, May 1949
Applegate, Shelton P. 1970. The vertebrate fauna of the Selma Formation of Alabama. Part VIII. The fishes. Fieldiana: Geology Memoirs, 3(8): 383–433. Desc. (pp. 390–393) & fig. Fig. 174 (p. 391).

Similihariotta dabasinskasi Zangerl, 1979
PF 8547 Holotype. One-half of a split concretion containing the complete outline, in lateral burial position, of an immature chondrichthyan.
Pennsylvanian: Westphalian Upper C or Lower D, Carbondale Fm., Francis Creek Shale, Essex concretion fauna.
Illinois: Will County: Peabody Coal Company, Pit 11.
Collector: Walter Dabaskinkas of Monticello, Wisconsin.
Zangerl, Ranier. 1979. New Chondrichthyes from the Mazon Creek fauna (Pennsylvanian) of Illinois, pp. 449–500. *In* Nitecki, Matthew H., ed., Mazon Creek Fossils. Academic Press, New York, N.Y., 581 pp. Desc. (pp. 471–474) & fig. Fig. 4 (p. 473).

Note: The type specimen had been sold to another private collector by Walter Dabasinskas after he had donated it to the museum and after it had been accessioned and catalogued (Dr. Rainer Zangerl, pers. comm., Nov. 10, 1989).

Suborder **COCHLIODONTOIDEI**
Family **COCHLIODONTIDAE** Owen, 1867

Cochliodus vanhornii St. John & Worthen, 1883
UC 9916 Cotype. Right ramus.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1883. Description of fossil fishes. A partial revision of the cochliodonts and psammodonts, including notices of miscellaneous materials acquired from the carboniferous formations of the United States. Geological Survey of Illinois, 7: 55–264. Desc. (pp. 120–126) & fig. Pl. 1, figs. 7A, 8A.

Deltodus inornatus Newberry, 1897
UC 6295 Cotypes. Posterior maxillary teeth.
Early Mississippian: Kinderhook.
Iowa: Marshall County: Le Grand.
Collector: William F. E. Gurley.
Newberry, John Strong. 1897. New species and a new genus of American Paleozoic fishes, together with notes on the genera *Oracan-*

thus, Dactylodus, Polyrhizodus, Sandalodus, Deltodus. Transactions of the New York Academy of Science, 16: 282–304. Desc. (p. 298) & fig. Figs. 10, 11.

Erismacanthus maccoyanus St. John & Worthen, 1875
UC 27328 Cotype. Fragmentary spine.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (p. 461) & fig. Pl. 22, fig. 3.
Cotype:
UC 27329 Spine. Desc. (p. 461) & fig. Pl. 22, fig. 1.

Lecracranthus unguiculus St. John & Worthen, 1875
UC 27338 Cotype. Tip of spine.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Missouri: St. Louis: Bremen Quarry.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (pp. 476–477) & fig. Pl. 22, figs. 10, 11.

Psephodus acutus Branson, 1905
UC 10036 Holotype. Median tooth.
Pennsylvanian.
Illinois: La Salle County: La Salle.
Collector: William F. E. Gurley.
Branson, E. B. 1905. Notes on some carboniferous cochliodonts with descriptions of seven new species. Journal of Geology, 13(1): 20–34. Desc. (pp. 24–25) & fig. Pl. i, fig. 1.

Psephodus placenta (Newberry & Worthen, 1866)
= Originally described as *Helodus placenta* Newberry & Worthen, 1866.
UC 9777 Holotype. Tooth.
Early Mississippian: Kinderhook Group.
Iowa: Des Moines County: Burlington.
Collector: William F. E. Gurley
Newberry, John Strong, and Amos H. Worthen. 1866. Descriptions of new species of vertebrates, mainly from the subcarboniferous limestone and coal measures of Illinois. Geological Survey of Illinois, 2: 9–134. Desc. (p. 80) & fig. Pl. 5, Figs. 4, 4A.

Psephodus politus Newberry, 1897
UC 6298 Cotypes. Teeth.
Mississippian: Osage: Burlington Fm.
Iowa: Des Moines County: Burlington.
Collector: William F. E. Gurley.
Newberry, John Strong. 1897. New species and a new genus of American Palæozoic fishes, together with notes on the genera *Oracanthus, Dactylodus, Polyrhizodus, Sandalodus, Deltodus.* Transactions of the New York Academy of Science, 16: 282–304. Desc. (p. 301) & fig. Pl. 24, figs. 13–23.

Sandalodus ellipticus Newberry, 1897
UC 10018 Holotype. Tooth (now badly broken).
Early Mississippian: Kinderhook Group.
Iowa: Marshalltown, Le Grand.
Collector: William F. E. Gurley.
Newberry, John Strong. 1897. New species and a new genus of American Palæozoic Fishes, together with notes on the genera *Oracanthus, Dactylodus, Polyrhizodus, Sandalodus, Deltodus.* Transactions of the New York Academy of Science, 16: 282–304. Desc. (pp. 299–301) & fig. Pl. 24, fig. 12.

Sandalodus emarginatus Branson, 1905
UC 10059 Cotypes. Teeth.
Mississippian: Osage Group, Keokuk Limestone.
Iowa: Lee County: Keokuk.
Collector: William F. E. Gurley.
Branson, E. B. 1905. Notes on some carboniferous cochliodonts with descriptions of seven new species. Journal of Geology, 13(1): 20–34. Desc. (p. 29) & fig. Pl. 2, figs. 1–3.

Sandalodus latidens Branson, 1905
UC 10035 Holotype. Tooth.
Mississippian: Osage Group, Keokuk Limestone.
Illinois: La Salle County: La Salle.
Collector: William F. E. Gurley.
Branson, E. B. 1905. Notes on some carboniferous cochliodonts with descriptions of seven new species. Journal of Geology, 13(1): 20–34. Desc. (p. 31) & fig. Pl. 1, fig. 11.

Sandalodus porcatus Branson, 1905
UC 10050 Holotype. Tooth.
Middle Mississippian: Meramec Group, St. Louis Limestone.

Indiana: Washington County: Salem.
Collector: William F. E. Gurley.
Branson, E. B. 1905. Notes on some carboniferous cochliodonts with descriptions of seven new species. Journal of Geology, 13(1): 20–34. Desc. (pp. 30–31) & fig. Pl. 1, fig. 14.

Suborder *Incertae sedis*

Jimpohlia erinacea Zangerl, 1979
PF 8539 Holotype. Part and counterpart, nearly whole specimen, lacking tail, of a very immature individual in approximately lateral burial position.
Pennsylvanian: Westphalian Upper C or Lower D, Carbondale Fm., Francis Creek Shale, Essex concretion fauna.
Illinois: Will County: Peabody Coal Company, Pit 11.
Collector: James Pohl, Mar. 27, 1978.
Zangerl, Rainer. 1979. New Chondrichthyes from the Mazon Creek fauna (Pennsylvanian) of Illinois, pp. 449–500. *In* Nitecki, Matthew H., ed., Mazon Creek Fossils. Academic Press, New York, N.Y., 581 pp. Desc. (pp. 475–481) & fig. Figs. 5, 6 (p. 476), fig. 6 (p. 479).

Superorder Unnamed
Order **INIOPTERYGIA** Zangerl & Case, 1973
Family **INIOPTERYGIDAE** Zangerl & Case, 1973

Iniopteryx rushlaui Zangerl & Case, 1973
PF 6678 Holotype. Male, well-preserved, articulated, nearly complete skeleton, lacking part of the skull.
Pennsylvanian: Westphalian D, Missouri Series, Bronson Group, Dennis Fm., Stark Shale.
Nebraska: Washington County: Ft. Calhoun, Ft. Calhoun Rock Prod. Co. Quarry, NW¼, NW¼, SE¼, Sec. 1, T17N, R12E.
Collector: W. Rushlau.
Zangerl, Rainer, and Gerard R. Case. 1973. Iniopterygia, a new order of chondrichthyan fishes from the Pennsylvanian of North America. Fieldiana: Geology Memoirs, 6(publ. #1167): 1–67. Desc. (pp. 7, 18) & fig. Fig. 18 (p. 14), figs. 19, 20 (p. 15), fig. 25 (p. 19).

Paratypes:
PF 2919 Braincase. Desc. (p. 10) & fig. Fig. 9 (p. 10).
PF 6587 Incomplete, partly articulated skeleton. Desc. (p. 7).
PF 6611 Pectoral fins. Desc. (p. 7).
PF 6643 Articulated partial skeleton, lacking part of skull and tail. Desc. (p. 7).
PF 6644 Articulate partial skeleton. Desc. (p. 7).
PF 6645 Excellent skeleton in side view, lacking tail. Desc. (pp. 7, 10) & fig. Fig. 10 (p. 10), figs. 14, 16A (p. 13).
PF 6646 Nearly complete skeleton. Desc. (pp. 7, 10, 16) & fig. Fig. 6 (p. 8), figs. 7, 8 (p. 9), fig. 16B (p. 13).
PF 6647 Anterior half of large specimen. Desc. (pp. 7, 10).
PF 6648 Anterior half of articulated skeleton. Desc. (p. 7).
PF 6649 Disarticulated partial skeleton. Desc. (p. 7).
PF 6658 Disarticulated specimen. Desc. (p. 7) & fig. Fig. 13B (p. 12).
PF 6660 Pectoral clasper hooks. Desc. (p. 7).
PF 6661 Articulated skeleton lacking tail fin. Desc. (pp. 7, 16–17, 19) & fig. Fig. 17 (p. 14).
PF 6662 Partial skeleton. Desc. (p. 7).
PF 6664 Isolated tail fin. Desc. (p. 7).
PF 6665 Minced skeleton. Desc. (p. 7).
PF 6666 Anterior half of skeleton. Desc. (p. 7).
PF 6667 Pectoral fin base. Desc. (p. 7).
PF 6669 Tail fin. Desc. (p. 7).
PF 6671 Tail fin. Desc. (p. 7) & fig. Fig. 12 (p. 11).
PF 6672 Articulated skeleton. Desc. (pp. 7, 10).
PF 6673 Partial skeleton. Desc. (p. 6).
PF 6674 Whole skeleton. Desc. (p. 6).
PF 6675 Anterior half of skeleton. Desc. (p. 6) & fig. Fig. 11 (p. 11), fig. 13A (p. 12).
PF 6676 Partial skeleton. Desc. (p. 7).
PF 6677 Anterior half of skeleton. Desc. (pp. 6, 16).
PF 6679 Gastric residue containing remains of this species. Desc. (p. 7).
PF 6680 Partial skeleton. Desc. (p. 7).
PF 6681–PF 6682 Pectoral fin. Desc. (p. 7).
PF 6683 Partial skeleton. Desc. (p. 7).
PF 6691 Articulated skeleton lacking skull and much of shoulder. Desc. (p. 7).

PF 6703 Skeleton lacking tail. Desc. (p. 7).
PF 6752 Partial skeleton. Desc. (p. 7).
PF 6754 Tail fin. Desc. (p. 7).
PF 6761 Tail fin. Desc. (pp. 7, 10). & fig. Fig. 13B (p. 12).
PF 6765 Partial skeleton. Desc. (p. 7).
PF 7032 Pectoral fin. Desc. (p. 17) & fig. Fig. 22 (p. 17).
PF 7123 Partial skeleton. Desc. (p. 7).
PF 7125 Posterior half of articulated skeleton. Desc. (p. 7) & fig. Fig. 24 (p. 18).
PF 7126 Disarticulated skull. Desc. (p. 7).
PF 7128 Partial skeleton. Desc. (p. 7).
PF 7132 Pectoral fin. Desc. (p. 7).
PF 7133 Jaws and teeth. Desc. (p. 7).
PF 7139 Disarticulated skeleton. Desc. (p. 7).
PF 7145–PF 7146 Skull and shoulder. Desc. (p. 7).
PF 7152 Articulated skeleton. Desc. (p. 7).
PF 7153 Gastric residue containing remains of this species. Desc. (p. 7).
PF 7165 Partial specimen. Desc. (p. 7).
PF 7166 Partly articulated skeleton. Desc. (p. 7).
PF 7167 Disarticulated skeleton. Desc. (p. 7).
PF 7170 Anterior portion of articulated skeleton. Desc. (pp. 7, 16).
PF 7176 Partial specimen. Desc. (p. 7).
PF 7181 Partial skeleton. Desc. (pp. 7, 16).
PF 7188 Disarticulated skeleton. Desc. (p. 7).
PF 7189 Anterior half of articulated skeleton. Desc. (p. 7).
PF 7190 Gastric residue containing this species. Desc. (p. 7).
PF 7191–PF 7192 Partial skeleton. Desc. (p. 7).
PF 7211 Anterior half of articulated skeleton. Desc. (p. 7).
PF 7219 Braincase. Desc. (p. 7).
PF 7220 Articulated skeleton lacking skull. Desc. (p. 7).
PF 7222 Part of skull. Desc. (p. 7).

Iniopteryx tedwhitei Zangerl & Case, 1973
PF 7241 Holotype. Male, articulated skeleton lacking tail region and clasper mechanism.
Pennsylvanian: Westphalian D, Kansas City Group, Westerville Fm., Wea Shale.
Nebraska: Sarpy County: On Route 370 halfway between Bellevue and Papillion, Hansen Quarry No. 6, Citywide Rock and Excavation Company, SE¼, NE¼, SW¼, Sec. 32, T14N, R13E.
Collector: W. Rushlau, 1970.
Zangerl, Rainer, and Gerard R. Case. 1973. Iniopterygia, a new order of chondrichthyan fishes from the Pennsylvanian of North America. Fieldiana: Geology Memoirs, 6(publ. #1167): 1–67. Desc. (pp. 21–22) & fig. Fig. 29 (p. 23).
Paratypes:
PF 5900 Part of skeleton showing rasp hooks. Desc. (p. 22) & fig. Fig. 30 (p. 23).
PF 6709 Skeleton lacking skull and shoulder-girdle. Desc. (p. 21).
PF 6753 Part of a skeleton. Desc. (p. 21).
PF 7202 Partial skeleton. Desc. (p. 21).
PF 7242 Skeleton. Desc. (pp. 21–22).

Promexyele bairdi Zangerl & Case, 1973
PF 6710 Holotype. Male skeleton lacking the tail region.
Pennsylvanian: Westphalian D, Kansas City Group, Westerville Fm., Wea Shale.
Nebraska: Sarpy County: On Route 370 halfway between Bellevue and Papillion, Hansen Quarry No. 6, Citywide Rock and Excavation Company, SE¼, NE¼, SW¼, Sec. 32, T14N, R13E.
Collector: Gerard R. Case.
Zangerl, Rainer, and Gerard R. Case. 1973. Iniopterygia, a new order of chondrichthyan fishes from the Pennsylvanian of North America. Fieldiana: Geology Memoirs, 6(publ. #1167): 1–67. Desc. (p. 31) & fig. Fig. 40 (p. 32), fig. 43 (p. 34).
Paratypes:
PF 6455 Disarticulated skeleton of juvenile. Desc. (p. 33).
PF 7200 Skull and shoulder, good pectoral fin. Desc. (pp. 31, 33) & fig. Fig. 41 (p. 33).
PF 7203 Partial skeleton. Desc. (p. 31).
PF 7243 Partial, articulated specimen. Desc. (p. 33).

Promexyele peyeri Zangerl & Case, 1973
PF 5911 Holotype. Male, somewhat disarticulated skeleton lacking some of the skull.
Pennsylvanian: Westphalian C, Linton Fm., Liverpool Cyclothem, Mecca Quarry Shale.
Indiana: Vermilion County: Moorehead's Bank, along Little Vermilion River.
Collectors: Rainer Zangerl and Eugene S. Richardson, Jr., June 1, 1961.
Zangerl, Rainer, and Gerard R. Case. 1973. Iniopterygia, a new order of chondrichthyan fishes from the Pennsylvanian of

North America. Fieldiana: Geology Memoirs, 6(publ. #1167): 1–67. Desc. (pp. 22, 26) & fig. Fig. 31 (p. 24), fig. 34 (p. 27), fig. 37 (p. 29), fig. 39 (p. 31).

Paratypes:

PF 2358 Anterior half of skeleton. Desc. (p. 23, 26–27) & fig. Fig. 36 (p. 28).

PF 2364 Partial skeleton. Desc. (p. 25).

PF 2510 Disarticulated head region. Desc. (p. 23).

PF 2815 Anterior half of skeleton. Desc. (p. 23).

PF 2916 Anterior half of skeleton. Desc. (pp. 23, 26).

PF 5896 Skull and pectoral region. Desc. (p. 23).

PF 6495 Partial skull. Desc. (p. 22).

PF 6497 Partial skeleton. Desc. (p. 22).

PF 6516 Partial skeleton. Desc. (p. 22).

PF 6522 Head region. Desc. (p. 22).

PF 6555 Partial skeleton. Desc. (p. 22).

PF 6578 Braincase. Desc. (p. 25) & fig. Fig. 32 (p. 25), fig. 33 (p. 26).

PF 6636 Partly articulated head and shoulder region. Desc. (p. 23).

PF 6657 Disarticulated anterior portion of skeleton. Desc. (p. 22).

PF 6724 Gastric residue mass containing teeth and tooth plates. Desc. (p. 23).

PF 7116 Partial skeleton. Desc. (p. 22).

Family **SIBYRHYNCHIDAE** Zangerl & Case, 1973

Iniopera richardsoni Zangerl & Case, 1973

PF 2356 Holotype. Male, skull and pectoral region in partial side position.

Pennsylvanian: Westphalian C, Staunton Fm., Lower Wiley Cyclothem, Logan Quarry Shale, Level G.

Indiana: Parke County: Reserve Twp., Logan Quarry, Level G, NE¼, SW¼, Sec. 9, T16N, R8W, about 1.75 mi E of West Union.

Collectors: Rainer Zangerl and Eugene S. Richardson, Jr., 1957–1958.

Zangerl, Rainer, and Gerard R. Case. 1973. Iniopterygia, a new order of chondrichthyan fishes from the Pennsylvanian of North America. Fieldiana: Geology Memoirs, 6(publ. #1167): 1–67. Desc. (pp. 46, 49, 56) & fig. Fig. 59 (p. 48), fig. 60 (p. 49), fig. 64 (p. 52), fig. 65 (p. 53).

Paratypes:

PF 1021 Partial skull. Desc. (p. 49).

PF 2353 Mandible and ?neurocranium. Desc. (p. 49).

PF 2359 Skeleton. Desc. (pp. 49, 51, 55–56) & fig. Fig. 61 (p. 50).

PF 2593 Skeleton. Desc. (p. 49) & fig. Fig. 67 (p. 54). (Note: Mislabelled as *Iniopteryx richardsoni.*)

PF 2807 Skull and shoulder. Desc. (p. 47).

PF 2825 Partial skull. Desc. (p. 47).

PF 2898 Disarticulated skull and jaws. Desc. (p. 47).

PF 2899 Disarticulated skull. Desc. (p. 47) & fig. Fig. 71 (p. 56).

PF 2902 Gastric residue. Desc. (p. 47).

PF 2905 Gastric residue. Desc. (p. 47).

PF 2919 Gastric residue, pectoral fin pouch. Desc. (p. 48).

PF 2924 Gastric residue containing numerous elements. Desc. (p. 48).

PF 2925 Gastric residue. Desc. (p. 48).

PF 2931 Disarticulated specimen, braincase and lower jaw. Desc. (p. 48).

PF 2932 Disarticulated skull. Desc. (p. 48) & fig. Fig. 70 (p. 55).

PF 2934 Gastric residue. Desc. (p. 48).

PF 2937 Gastric residue. Desc. (p. 48).

PF 5886 Disarticulated skeleton. Desc. (p. 49).

PF 5889 Disarticulated skeleton. Desc. (p. 49).

PF 6426 Partial skeleton. Desc. (p. 47).

PF 6443 Juvenile specimen. Desc. (p. 47).

PF 6449 Chewed skull and shoulder. Desc. (p. 47).

PF 6454 Partial skeleton. Desc. (p. 47).

PF 6465 Gastric residue. Desc. (p. 47).

PF 6498 Partial skeleton. Desc. (p. 47).

PF 6499 Gastric residue. Desc. (p. 47).

PF 6505 Disarticulated skeleton. Desc. (p. 47).

PF 6507 Partial skull, lower jaw. Desc. (p. 47).

PF 6512 Disarticulated skull. Desc. (p. 47).

PF 6526 Chewed individual. Desc. (p. 47).

PF 6527 Partial skeleton, has both pectoral pouches. Desc. (p. 47).

PF 6528 Juvenile in gastric residue. Desc. (p. 47).

PF 6530 Gastric residue containing 2 specimens. Desc. (p. 47).

PF 6533 Partial skeleton. Desc. (p. 47).

PF 6534 Articulated skeleton of juvenile. Desc. (p. 47).

PF 6535 Skeleton. Desc. (pp. 47, 56) & fig. Fig. 77 (p. 59).

PF 6540 Chewed partial skeleton. Desc. (p. 47).
PF 6542 Disarticulated skull. Desc. (p. 47).
PF 6550 Gastric residue. Desc. (p. 47).
PF 6553 Nearly complete skeleton. Desc. (p. 47).
PF 6554 Anterior half of specimen. Desc. (p. 47).
PF 6561 Anterior part of skeleton. Desc. (p. 47) & fig. Fig. 68 (p. 54).
PF 6564 Two chewed specimens. Desc. (p. 47).
PF 6569 Minced specimen. Desc. (p. 47).
PF 6589 Disarticulated skeleton with both pouch fills. Desc. (p. 49).
PF 6591 Minced specimen. Desc. (p. 47).
PF 6612 Chewed specimen with lower jaw. Desc. (p. 47).
PF 6622 Anterior two-thirds of an articulated specimen with pouch fills. Desc. (pp. 49, 51, 56) & fig. Fig. 62 (p. 51), fig. 74 (p. 57).
PF 6624 Scattered elements. Desc. (p. 49).
PF 6625 Disarticulated skull. Desc. (p. 49).
PF 6626 Lower jaw with tooth whorls in place. Desc. (p. 49).
PF 6630 Disarticulated specimen. Desc. (p. 49) & fig. Fig. 66 (p. 53).
PF 6631 Disarticulated specimen. Desc. (p. 49).
PF 6638 Disarticulated specimen. Desc. (p. 49) & fig. Fig. 73 (p. 56).
PF 6640 Anterior two-thirds of an articulated specimen with pouch fill. Desc. (p. 49).
PF 6654 Articulated partial skeleton. Desc. (p. 46).
PF 6655 Partial skeleton. Desc. (p. 46).
PF 6656 Articulated partial skeleton. Desc. (pp. 46, 56) & fig. Fig. 75 (p. 58).
PF 6659 Isolated rasp hooks with large star-shaped bases. Desc. (p. 49).
PF 6685 Partial skull. Desc. (p. 46).
PF 6690 Gastric residue. Desc. (p. 46).
PF 6692 Part of skull. Desc. (p. 46).
PF 6695 Skull and lower jaw with tooth whorls in place. Desc. (p. 46).
PF 6697 Part of skull. Desc. (p. 46).
PF 6699 Head and shoulder region. Desc. (p. 46).
PF 6717 Gastric residue. Desc. (p. 49).
PF 6726 Gastric residue. Desc. (p. 49).
PF 6737 Gastric residue. Desc. (p. 49).
PF 6739 Part of cranium. Desc. (p. 49).
PF 6749 Gastric residue. Desc. (p. 46).
PF 7115 Gastric residue containing pectoral fin pouch. Desc. (p. 49).
PF 7124 Partial skeleton. Desc. (pp. 46, 56).
PF 7129 Patch of dermal denticles. Fig. 63 (p. 51).
PF 7185 Incomplete juvenile specimen. Desc. (p. 46).
PF 7204 Articulated partial skeleton. Desc. (p. 46).
PF 7205 Articulated juvenile specimen. Desc. (p. 46).
PF 7209 Articulated partial juvenile skeleton. Desc. (p. 46).
PF 7210 Partial skeleton. Desc. (p. 46).
PF 7212 Partial skeleton. Desc. (p. 46).

Inioxyele whitei Zangerl & Case, 1973

PF 6651 Holotype. Male, large portion of a skeleton divided on plate and counterplate, lacking the tail and much of the vertebral column.

Pennsylvanian: Stephanian A, Virgil Series, Shawnee Group, Lecompton Group, Queen Hill Shale.

Nebraska: Cass County: Plattsmouth, Ace Hill Quarry of the Midwest Construction Company, E½, SW¼, SW¼, Sec. 33, T12N, R14E.

Collector: W. D. White.

Zangerl, Rainer, and Gerard R. Case. 1973. Iniopterygia, a new order of chondrichthyan fishes from the Pennsylvanian of North America. Fieldiana: Geology Memoirs, 6(publ. #1167): 1–67. Desc. (pp. 60–64) & fig. Fig. 79 (p. 61), figs. 80–82 (p. 62), fig. 83 (p. 63).

Sibyrhynchus denisoni Zangerl & Case, 1973

PF 6408 Holotype. Male, slightly disarticulated skeleton, lacking tail.

Pennsylvanian: Westphalian D, Petersburg Fm., Excello Shale equivalent, black, sheety shale over Coal IV-A.

Indiana: Pike County: About ¼ mi SE of Bethel Church, stripmine headwall about center of NW¼, Sec. 3, T3S, R7W, Augusta Quadrangle, north of Barret Cemetery.

Zangerl, Rainer, and Gerard R. Case. 1973. Iniopterygia, a new order of chondrichthyan fishes from the Pennsylvanian of North America. Fieldiana: Geology Memoirs, 6(publ. #1167): 1–67. Desc. (pp. 35–36, 41, 43) & fig. Fig. 47 (p. 39).

Paratypes:

PF 1019 Scattered remains. Desc. (p. 36).

PF 1034 Scattered remains. Desc. (p. 36) & fig. Fig. 46 (p. 39).

PF 1036 Small articulated skeleton, missing skull. Desc. (p. 36).

PF 2351 Gastric residue pellet. Desc. (p. 36).

PF 2354 Part of a skull. Desc. (p. 36).

PF 2355 Multilated skull and shoulder region. Desc. (p. 36).

PF 2363 Mutilated skull. Desc. (p. 36).

PF 2365 Gastric residue pellet. Desc. (p. 36).

PF 2592 Gastric residue. Desc. (p. 36).

PF 2594 Part of a skull. Desc. (pp. 36, 40) & fig. Fig. 50 (p. 42).

PF 2632 Disarticulated specimen, good braincase, lower jaw. Desc. (pp. 36, 38, 43) & fig. Fig. 44 (p. 37), fig. 45 (p. 38), fig. 55 (p. 46), fig. 57 (p. 47).

PF 2806 Partial skeleton. Desc. (p. 35).

PF 2819 Mutilated skull. Desc. (pp. 35, 41).

PF 2835 Gastric residue. Desc. (p. 35).

PF 2900 Scatter of hard parts. Desc. (p. 35).

PF 2915 Gastric residue pellet. Desc. (p. 36).

PF 2918 Gastric residue. Desc. (pp. 36, 41) & fig. Fig. 52 (p. 43).

PF 2920 Mutilated, partial skeleton. Desc. (p. 36).

PF 2936 Gastric residue mass. Desc. (p. 36).

PF 2940 Scattered skeleton. Desc. (p. 36).

PF 3013 Gastric residue. Desc. (p. 36).

PF 5879 Gastric residue. Desc. (p. 36).

PF 5894 Mutilated skull. Desc. (p. 36).

PF 6463 Gastric residue mass. Desc. (p. 35).

PF 6504 Chewed skull. Desc. (p. 35).

PF 6506 Clasper apparatus and partial tail fin. Desc. (pp. 35–36, 42–43) & fig. Fig. 54 (p. 45).

PF 6514 Chewed skull. Desc. (p. 35) & fig. Fig. 46 (p. 39).

PF 6515 Gastric residue. Desc. (p. 35).

PF 6525 Gastric residue. Desc. (p. 35).

PF 6537 Gastric residue. Desc. (p. 35).

PF 6538 Gastric residue. Desc. (p. 35).

PF 6539 Partial skull. Desc. (p. 35).

PF 6559 Gastric residue. Desc. (pp. 35, 41).

PF 6565 Gastric residue. Desc. (p. 35).

PF 6576 Mutilated skull. Desc. (p. 35).

PF 6582 Gastric residue mass. Desc. (pp. 35, 41).

PF 6615 Large portion of articulated skeleton with good vertebral column and pelvic area. Desc. (pp. 35–36, 42–43) & fig. Fig. 46 (p. 39), fig. 53 (p. 44).

PF 6616 Chewed remains of skull. Desc. (p. 35).

PF 6617 Gastric residue. Desc. (pp. 35, 41) & fig. Fig. 51 (p. 43), fig. 52 (p. 43).

PF 6623 Gastric residue mass. Desc. (p. 36).

PF 6634 Good partial skeleton. Desc. (pp. 36, 38).

PF 6635 Slightly mutilated skull. Desc. (p. 36).

PF 6637 Gastric residue. Desc. (p. 36).

PF 6639 Part of a fair-sized specimen without skull. Desc. (pp. 36, 43).

PF 6641 Disarticulated, large specimen. Desc. (p. 36).

PF 6650 Part of a skull. Desc. (pp. 36, 40) & fig. Fig. 49 (p. 41).

PF 6716 Gastric residue mass. Desc. (p. 36).

PF 6729 Gastric residue mass. Desc. (p. 35).

PF 6730 Gastric residue. Desc. (p. 36).

PF 6747 Gastric residue. Desc. (p. 36).

PF 6757 Scatter of parts. Desc. (pp. 36, 38).

PF 6760 Gastric residue. Desc. (p. 36).

PF 6762 Isolated hard parts. Desc. (p. 36).

PF 6764 Gastric residue pellet. Desc. (p. 36).

PF 7216 Scatter of hardparts. Desc. (p. 35).

PF 7224 Scatter of hardparts. Desc. (p. 35).

Order Unnamed

Family **POLYSENTORIDAE** Zangerl, 1979

Polysentor gorbairdi Zangerl, 1979

PF 8445 Holotype. One-half of a split concretion containing one male skeleton of a small chondricthyan in lateral position.

Pennsylvanian: Westphalian Upper C or Lower D, Carbondale Fm., Francis Creek Shale, Essex concretion fauna.

Illinois: Grundy County: Old spoil cone of the No. 4 Coal Mine tipple near Braceville.

Collector: Gordon C. Baird, 1977.

Zangerl, Rainer. 1979. New Chondrichthyes from the Mazon Creek fauna (Pennsylvanian) of Illinois, pp. 449–500. *In* Nitecki, Matthew H., ed., Mazon Creek Fossils. Academic Press, New York, N.Y., 581 pp. Desc. (pp. 458–471) & fig. Fig. 1A,B (p. 462), fig. 2 (p. 463), fig. 3 (p. 464).

Paratype:

PF 8548 Part and counterpart, incomplete skeleton including the tail and dermal denticle strands that mark the course of the sensory lines. Desc. (pp. 460, 466, 468–470) & fig. Fig. 1C (p. 462).

Class **TELEOSTOMI**
Subclass **ACANTHODII** Owen, 1846
Order **CLIMATIIDA** Berg, 1940
Family **GYRACANTHIDAE** Woodward, 1906

Oracanthus vetustus Leidy, 1855
= Originally described as *Oracanthus consimilis* St. John & Worthen, 1875.
UC 27342 Holotype for *Oracanthus consimilis* St. John & Worthen, 1875. Spine.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Illinois: Madison County: Alton.
Collector: Sir William Cornelius Van Horne.
St. John, Orestes H., and Amos H. Worthen. 1875. Paleontology of Illinois. Sec. 1. Description of fossil fishes. Geological Survey of Illinois, 6: 245–488. Desc. (p. 478) & fig. Pl. 22, fig. 15.

Note: Colin Patterson (1965) believed this to be related to the edestid elasmobranch *Physonemus.*

Oracanthus farringtoni Roy, 1929
P 25165 (formerly P 21702) Holotype. Spine.
Mississippian: Kinderhook Fm.
Iowa: Marshall County: Le Grand area.
Collector: O. B. Jacobs.
Roy, Sharat Kumar. 1929. Contributions to paleontology. Fieldiana: Geology, 4(5, publ. #254): 201–222. Desc. (pp. 218–220) & fig. Pl. 46, figs. 1–4.

Note: Colin Patterson (1965, p. 152) thought this to be an edestid shark near the genus *Physonemus.*

Oracanthus lineatus Newberry, 1897
UC 9918 Holotype. One spine.
Middle Mississippian: Meramec Group, St. Louis Limestone.
Indiana: Washington County: Spergen Hill near Harristown Railroad Station, a few miles SE of Salem.
Collector: William F. E. Gurley.
Newberry, John Strong. 1897. New species and a new genus of American Palæozoic fishes, together with notes on the genera *Oracanthus, Dactylodus, Polyrhizodus, Sandalodus, Deltodus.* Transactions of the New York Academy of Sciences 16: 282–304. Desc. (pp. 289–290) & fig. Pl. 22, figs. 4, 5 (fig. 4 mislabeled in explanation).

Note: Colin Patterson (1965, p. 154) stated, "There is no ground for thinking that this spine is in any way related to the typical spines of *Oracanthus.*"

Subclass **OSTEICHTHYES** Huxley, 1880
Infraclass **CROSSOPTERYGII**
Superorder **RHIPIDISTIA**
Order **OSTEOLEPIDIDA**
Family **RHIZODONTIDAE** Traquair, 1881

Litoptychus bryanti Denison, 1951
PF 610 Holotype. Jaw.
Late Devonian: Chaffee Fm., Bed 29.
Colorado: Gunnison County: NE side of Deadman's Gulch, NE of Gunnison, NW¼, Sec. 23, T14S, R84W.
Collector: Robert H. Denison, May 1949.
Denisons, Robert H. 1951. Late Devonian fresh-water fishes from the western United States. Fieldiana: Geology, 11(5, publ. #686): 219–261. Desc. (pp. 242–248) & fig. Fig. 46 (p. 247).
Paratypes:
PF 611 Three vertebrae. Desc. (p. 247).
PF 612 Inner face of opercular. Desc. (p. 246).
PF 613 Jaw. Desc. (pp. 244–245) & fig. Fig. 45 (p. 246).
PF 614 Parasphenoid. Desc. (p. 246).
PF 616 Miscellaneous fragments. Desc. (p. 244) & fig. Fig. 43B (p. 244).
PF 617 Scale. Desc. (p. 243) & fig. Fig. 42B (p. 242).
PF 618 Skeletal fragments. Desc. (p. 245) & fig. Fig. 44 (p. 245).
PF 619 Skull parts, jaw, scale. Desc. (pp. 243–245, 247) & fig. Fig. 42A (p. 242), fig. 43A (p. 244).

Superorder **ACTINISTIA** Cope, 1871
Order **COELACANTHIDA**
Family **COELACANTHIDAE** Agassiz, 1843

Rhabdoderma welleri (Eastman, 1908)
= Originally described as *Coelacanthus welleri* Eastman, 1908.
UF 354 (formerly UC 12631) Holotype. Partial skeleton.
Lower Mississippian: Kinderhook Group.
Iowa: Des Moines County: Near Burlington, Granite Brick Works.

Collector: Stuart Weller, 1902.

Eastman, Charles Rochester. 1908. Notice of a new coelacanth fish from the Iowa Kinderhook. Journal of Geology, 16: 357–362. Desc. (pp. 358–362) & fig. Fig. 1 (p. 359).

Infraclass **DIPNOI** Müller, 1844
Infraclass **DIPNOI** *Incertae sedis*

Esconichthys apopyris Bardack, 1974

PF 5691 Holotype. Part and counterpart, whole fish.

Middle Pennsylvanian: Desmoinesean, Westphalian D, Carbondale Fm., Francis Creek Shale Member.

Illinois: Will County: Peabody Coal Company, Pit 11, SW¼, Sec. 32, T32N, R9E.

Collectors: R. Johnson and Ida Thompson, Field Museum Fieldtrip, 1968.

Bardack, David. 1974. A larval fish from the Pennsylvanian of Illinois. Journal of Paleontology, 48(5): 988–993. Desc. (pp. 989–992).

Paratypes:

PF 11341 Part and counterpart. Desc. (p. 990).

PF 3028 (formerly Jerry Herdina no. 101) Whole specimen. Desc. (p. 989) & fig. Pl. 1, fig. 2 (p. 988).

PF 5692 Part and counterpart. Desc. (p. 990).

PF 5712 Part and counterpart. Desc. (p. 990).

PF 6397 Part and counterpart. Desc. (p. 990).

Note: See Bruner (1988) about the taxonomic status of *Esconichthys apopyris* Bardack, 1974.

Order **DIPNORHYNCHIDA**
Family **DIPNORHYNCHIDAE** Berg, 1940

Uranolophus wyomingensis Denison, 1968

PF 3874 Holotype. Articulated fish lacking the posterior and ventral portions of the body.

Early Devonian: Beartooth Butte Fm.

Wyoming: Bighorn County: Cottonwood Canyon, E of Lovell, NE¼, Sec. 4, T56N, R93W.

Collectors: Eugene S. Richardson, Jr. and Orville L. Gilpin, 1962

Denison, Robert H. 1968. Early Devonian lungfishes from Wyoming, Utah, and Idaho. Fieldiana: Geology, 17(4, publ. #1044): 351–413. Desc. (356–406) & fig. Fig. 1 (p. 355), fig. 2 (p. 357), fig. 4 (p. 362), fig. 19 (p. 393), fig. 21 (p. 397), fig. 23D (p. 401).

Paratypes:

PF 140 Flank scales. Desc. (p. 356).

PF 275 Flank scales. Desc. (p. 356).

PF 278–PF 280 Flank scales. Desc. (p. 356).

PF 1427 Skull. Desc. (pp. 356, 362, 364, 388) & fig. Fig. 3A (p. 358).

PF 3318 Lower jaws. Desc. (p. 356, 380, 388) & fig. Fig. 14B (p. 381).

PF 3319 Associated scales. Desc. (p. 356).

PF 3792 Skull. Desc. (pp. 356, 369–370, 372, 383, 405) & fig. Fig. 10A,B (p. 373), fig. 15C,D (p. 385).

PF 3793 Palate. Desc. (pp. 356, 370, 384) & fig. Fig. 9A (p. 371).

PF 3794 Skull. Desc. (p. 356).

PF 3795 Skull and jaws. Desc. (pp. 356, 362).

PF 3796 Palate. Desc. (pp. 356, 370, 373) & fig. Fig. 9B (p. 371).

PF 3797 Lower jaws. Desc. (pp. 356, 378, 380, 399, 405).

PF 3798 Lower jaws. Desc. (pp. 356, 380) & fig. Fig. 13B (p. 379), fig. 14A (p. 381).

PF 3801 Pterygoid. Desc. (p. 356).

PF 3802 Prearticulars. Desc. (p. 356).

PF 3803 Pterygoid. Desc. (p. 356).

PF 3804 Lower jaws. Desc. (p. 356).

PF 3805 Skull. Desc. (pp. 356, 365, 369–370, 372, 378, 388, 399, 405) & fig. Fig. 6 (p. 365), fig. 8 (p. 368), fig. 15A,B (p. 385).

PF 3806 Fragment of skull. Desc. (p. 399).

PF 3807 Pterygoid. Desc. (pp. 356, 373, 383).

PF 3808 Lower jaws. Desc. (pp. 356, 399).

PF 3816 Skull. Desc. (pp. 356, 364, 383, 386, 388, 405–406) & fig. Fig. 5 (p. 363).

PF 3817 Skull. Desc. (p. 356).

PF 3833–PF 3834 Operculars. Desc. (p. 356).

PF 3835 Operculars. Desc. (pp. 356, 405) & fig. Fig. 11A (p. 375), fig. 12 (p. 377).

PF 3836 Subopercular. Desc. (p. 356) & fig. Fig. 11C (p. 375), fig. 12 (p. 377).

PF 3837 Subopercular. Desc. (p. 356).

PF 3838 Gulars. Desc. (p. 356, 378) & fig. Fig. 11F (p. 375), fig. 12 (p. 377).

PF 3839 Operculars. Desc. (pp. 356, 405) & fig. Fig. 11B (p. 375).

PF 3840 Subopercular. Desc. (p. 356).

PF 3841 Plate. Desc. (p. 356).

PF 3843 Snout. Desc. (p. 356).

PF 3844 Pterygoid. Desc. (p. 356).

PF 3845 Lower jaws. Desc. (p. 356).

PF 3846 Cleithra. Desc. (pp. 356, 391) & fig. Fig. 17B (p. 390), fig. 18 (p. 391).

PF 3847 Snout. Desc. (p. 356).

PF 3848 Snout. Desc. (pp. 356, 399).

PF 3849 Lower jaws. Desc. (p. 356) & fig. Fig. 22B (p. 398).
PF 3850 Lower jaws. Desc. (p. 356).
PF 3851 Cleithra and clavicles. Desc. (pp. 356, 389, 391) & fig. Fig. 17A (p. 390), fig. 18 (p. 391).
PF 3852 Opercular. Desc. (p. 356).
PF 3855 Lower jaws. Desc. (p. 356).
PF 3856 Cleithra. Desc. (p. 356) & fig. Fig. 17C (p. 390).
PF 3857 Prearticulars. Desc. (p. 356).
PF 3858 Lower jaws. Desc. (p. 356).
PF 3859 Cleithra. Desc. (p. 356).
PF 3860 Snout. Desc. (p. 356).
PF 3861 Lower jaws. Desc. (p. 356).
PF 3862 Associated lower jaws, opercular, subopercular, ceratohyal and scales. Desc. (pp. 356, 376, 394, 396, 399, 405) & fig. Fig. 11D (p. 375), fig. 12 (p. 377), fig. 20F (p. 395).
PF 3863 Lower jaws. Desc. (p. 356).
PF 3864 Prearticulars. Desc. (p. 356) & fig. Fig. 15E (p. 385).
PF 3865 ?Interclavicle. Desc. (pp. 356, 392) & fig. Fig. 17D (p. 390).
PF 3866 Gulars. Desc. (pp. 356, 377) & fig. Fig. 11E (p. 375).
PF 3867 Pterygoid. Desc. (pp. 356, 373, 383).
PF 3868 Snout. Desc. (pp. 356, 365, 399) & fig. Fig. 7A,B (p. 366).
PF 3869 Lower jaws. Desc. (p. 356).
PF 3870 Opercular. Desc. (pp. 356, 376).
PF 3874 Skull. Desc. (pp. 363–364, 374, 377–378, 387–389, 394, 396, 405) & fig. Fig. 2 (p. 357), fig. 4 (p. 362), fig. 19 (p. 393), fig. 21A,B (p. 397), fig. 23 (p. 401).
PF 4333 Cleithra. Desc. (p. 356).
PF 5364 Cleithra and clavicles. Desc. (pp. 356, 391).
PF 5514 Ceratohyals. Desc. (p. 356) & fig. Fig. 16 (p. 387).
PF 5515 Undetermined plate. Fig. Fig. 22A (p. 398).
PF 5518 Suboperculars. Desc. (p. 356).
PF 5519 Gulars. Desc. (pp. 356, 377).
PF 5520 Ceratohyals. Desc. (p. 356).
PF 5522 Suboperculars. Desc. (p. 356).
PF 5524 Pterygoid. Desc. (p. 356).
PF 5536 Median dorsal scales. Desc. (p. 356).
PF 5541 Posterior flank scales. Desc. (p. 356) & fig. Fig. 24 (p. 402), fig. 25 (p. 403).
PF 5542–PF 5543 Flank scales. Desc. (p. 356).
PF 5544 Median dorsal scales. Desc. (pp. 356, 396) & fig. Fig. 20D,F (p. 395).
PF 5545 Median dorsal scales. Desc. (pp. 356, 396) & fig. Fig. 20E (p. 395).
PF 5546 Various associated scales. Desc. (pp. 356, 394) & fig. Fig. 20A (p. 395).
PF 5547 Flank scales. Desc. (p. 356) & fig. Fig. 20C (p. 395).
PF 5548 Flank scales. Desc. (p. 356) & fig. Fig. 20B (p. 395).
PF 5549 Median dorsal scales. Desc. (p. 356).
PF 5550 Flank scales. Desc. (p. 356).
PF 5551 Lower jaws. Desc. (p. 356).

Order **CTENODONTIDA**
Family **CTENODONTIDAE** Woodward, 1891

Ctenodus cristatus Agassiz, 1843
= Originally described as *Sagenodus cristatus* Eastman, 1903.
PF 6188 Cast of holotype for *Sagenodus cristatus* Eastman, 1903. Tooth in counterpart.
Pennsylvanian: Carbondale Fm.
Illinois: Grundy County: Mazon Creek.
Eastman, Charles Rochester. 1903. Carboniferous fishes from the central western States. Bulletin Museum of Comparative Zoology, 39: 163–226. Desc. (p. 188) & fig. Pl. 3, fig. 30 (p. 194).

Family **SAGENODONTIDAE**

Megapleuron zangerli Schultze, 1977
R 5323 (in private collection of Mrs. L. Rockwell, Chicago, Illinois) Holotype.
Middle Pennsylvanian: Desmoinesean, Westphalian D, Carbondale Fm., Francis Creek Shale Member.
Illinois: Will and Kankakee counties: Peabody Coal Company, Pit 11.
Schultze, Hans-Peter. 1977. *Megapleuron zangerli* a new dipnoan from the Pennsylvanian, Illinois. Fieldiana: Geology, 33(21): 375–396. Desc. (pp. 381–390).
Paratypes:
PF 3200 Part and counterpart. Desc. (pp. 381, 385–386, 390) & fig. Fig. 7 (p. 387), fig. 8 (p. 388).
PF 5707 Part and counterpart. Desc. (pp. 381–382, 385–386, 388–389).
PF 8329 Part and counterpart. Desc. (p. 390).
PF 8369 Part and counterpart. Desc. (pp. 381, 390) & fig. Fig. 9A (p. 389).

PF 8370 Part and counterpart. Desc. (pp. 381, 386, 388).

Proceratodus carlinvillensis Romer & Smith, 1934
UC 2091 Holotype. Dental tooth plate.
Pennsylvanian: McLeansboro Fm., Coal Measures.
Illinois: Macoupin County: Carlinville.
Collector: William F. E. Gurley.
Romer, Alfred Sherwood, and Homer J. Smith. 1934. American carboniferous dipnoans. Journal of Geology, 42(7): 700–719. Desc. (p. 715) & fig. Fig. 6 (p. 715).

Sagenodus ciscoensis Romer & Smith, 1934
UC 2205 (Note: Referred to as UC 2204 in publication) Cotypes. Three teeth.
Late Pennsylvanian or Early Permian: Cisco Group, Putnam Fm., Coleman Junction Limestone.
Texas: NE Throckmorton County: Sc. 3051 T.E. and L. Surv.
Romer, Alfred Sherwood, and Homer J. Smith. 1934. American carboniferous dipnoans. Journal of Geology, 42(7): 700–719. Desc. (p. 714) & fig. Fig. 3D (p. 708), Fig. 5B,C,E (p. 713).

Sagenodus paucicristatus (Cope, 1877)
= Originally described as *Ceratodus paucicristatus* Cope, 1877.
UC 6505 Holotype for *Ceratodus paucicristatus* Cope, 1877. Imperfect dental plate.
Pennsylvanian: Early Conemaugh, Middle McLeansboro Fm.
Illinois: Vermilion County: Horseshoe Bend of Vermilion River.
Collector: William F. E. Gurley.
Cope, Edward Drinker. 1877. On the Vertebrata of the bone bed in eastern Illinois. Proceedings of the American Philosophical Society, 17: 52–63. Desc. (p. 53). No figure.

Sagenodus serratus (Newberry, 1875)
= Originally described as *Ctenodus fossatus* Cope, 1877.
UC 6506 Holotype for *Ctenodus fossatus* Cope, 1877. Left mandibular plate.
Pennsylvanian: Early Conemaugh, Middle McLeansboro Fm.
Illinois: Vermilion County: Horseshoe Bend of Vermilion River.
Collector: William F. E. Gurley.
Cope, Edward Drinker. 1877. On the Vertebrata of the Bone Bed in eastern Illinois. Proceedings of the American Philosophical Society, 17: 52–63. Desc. (pp. 53–54).

Sagenodus serratus (Newberry, 1875)
= Originally described as *Ctenodus gurleyanus* Cope, 1877.
UC 6509 Holotype for *Ctenodus gurleyanus* Cope, 1877. Upper dental plate.
Pennsylvanian: Early Conemaugh, Middle McLeansboro Fm.
Illinois: Vermilion County: Horseshoe Bend of Vermilion River.
Collector: William F. E. Gurley.
Cope, Edward Drinker. 1877. On the Vertebrata of the Bone Bed in eastern Illinois. Proceedings of the American Philosophical Society, 17: 52–63. Desc. (p. 54).

Sagenodus serratus (Newberry, 1875)
= Originally described as *Ctenodus vabasensis* Cope, 1883.
UC 6510 Holotype for *Ctenodus vabasensis* Cope, 1883. Dental plate.
Pennsylvanian: Early Conemaugh, Middle McLeansboro Fm.
Illinois: Vermilion County: Horseshoe Bend of Vermilion River.
Collector: William F. E. Gurley.
Cope, Edward Drinker. 1883. On some Vertebrata from the Permian of Illinois. Proceedings Philadelphia Academy of Natural Sciences, 35: 108–110. Desc. (p. 110).

Sagenodus vinslovii (Cope, 1875)
= Originally described as *Ceratodus vinslovii* Cope, 1875.
UC 6507 Holotype. Left palatal plate.
Pennsylvanian: Early Conemaugh, Middle McLeansboro Fm.
Illinois: Vermilion County: Horseshoe Bend of Vermilion River.
Collector: William F. E. Gurley.
Cope, Edward Drinker. 1875. On fossil remains of Reptilia and fishes from Illinois. Proceedings Philadelphia Academy of Natural Sciences, 27: 404–411. Desc. (pp. 410–411).

Tranodis castrensis (Romer & Smith, 1934)
= Originally described as *Prosagenodus castrensis* Romer & Smith, 1934.
UF 408 (formerly UC 12245). Holotype. Tooth.
Late Mississippian: Chester Group.
Illinois: Randolph County: Near Chester.
Collector: William F. E. Gurley.
Romer, Alfred Sherwood, and Homer J. Smith.

1934. American carboniferous dipnoans. Journal of Geology, 42(7): 700–719. Desc. (pp. 700–702) & fig. Fig. 1 (p. 701).

Order **URONEMIDA**
Family **CONCHOPOMIDAE** Berg, 1940

Conchopoma arctata (Cope, 1877)
= Originally described as *Peplorhina arctata* Cope, 1877.
UC 6511 Holotype. Incomplete dentigerous plate.
Pennsylvanian: Early Conemaugh, Middle McLeansboro Fm.
Illinois: Vermilion County: Horseshoe Bend of Vermilion River.
Collector: William F. E. Gurley.
Cope, Edward Drinker. 1877. On the Vertebrata of the bone bed in eastern Illinois. Proceedings of the American Philosophical Society, 17: 52–63. Desc. (p. 54). No figure.

Conchopoma edesi Denison, 1969
PF 5611 Holotye. Nearly complete fish laterally preserved in part and counterpart.
Middle Pennsylvanian: Carbondale Fm., Francis Creek Shale Member.
Illinois: Will County: Peabody Coal Company, Pit 11.
Collector: Thomas Edes.
Denison, Robert H. 1969. New Pennsylvanian lungfishes from Illinois. Fieldiana: Geology, 12(12): 193–211. Desc. (pp. 195–196, 199–200, 202–206) & fig. Fig. 103 (p. 196), fig. 104 (p. 197), fig. 109 (p. 205).
Paratypes:
PF 5695 Small, nearly complete fish, dorsoventrally preserved in counterpart. Desc. (pp. 195–196, 202, 204, 206) & fig. Fig. 107 (p. 202), fig. 108 (p. 203).
PF 8903 (= Herdina 389). Anterior half of a small articulated fish, flattened dorsoventrally and preserved in counterpart. Desc. (pp. 195, 198–200, 202–203, 206) & fig. Fig. 105 (p. 198), fig. 106 (p. 201).

Order **LEPIDOSIRENIDA**
Family **LEPIDOSIRENIDAE** Bonaparte, 1841

Gnathorhiza dikeloda Olson, 1951
UF 91 Holotype. Jaw with teeth.
Early Permian: Clear Fork Group, upper part of Vale Fm.
Texas: Knox County: About 7 mi N of Vera, Locality KF.
Collector: Everett Claire Olson, 1948.
Olson, Everett Claire. 1951. Fauna of Upper Vale and Choza: 1–5. Fieldiana: Geology, 10(11): 89–128. Desc. (pp. 106, 108) & fig. Fig. 47A,B (p. 107), fig. 50D (p. 111).
Paratypes:
UF 87 Tooth. Desc. (pp. 107–108) & fig. Fig. 48F (p. 109).
UF 88 Tooth. Desc. (pp. 105, 107–108) & fig. Fig. 48E (p. 109).
UF 89 Tooth. Desc. (p. 107).
UF 90 Tooth in jaw. Desc. (pp. 107–108).
UF 92–UF 93 Tooth in jaw. Desc. (pp. 107–108).
UF 94 Tooth. Desc. (pp. 107–108).
UF 118 Jaw. Fig. 50E (p. 111). (Note: see UF 195).
UF 164 Skull plate D. Fig. 51L (p. 112).
UF 165 Skull plate D. Fig. 51K (p. 112).
UF 166 Skull plate D. Fig. 51H (p. 112).
UF 168 Parasphenoid. Fig. 49B (p. 110).
UF 169 Jaw with tooth. Fig. 50F (p. 111).
UF 171 Skull fragments, plates F, B and exoccipital process. Fig. 49C (p. 110), Fig. 51E (p. 112).
UF 173 Skull plates, including F and M + L1 + L2 + K. Fig. 51F (p. 112), fig. 52F (p. 113).
UF 174 Skull plates, including D. Fig. 51J (p. 112).
UF 175 Skull bones: B, exocippital, I, parasphenoid, "etc." Fig. 49A (p. 110), fig. 51B,C (p. 112), fig. 52L (p. 113).
UF 176 Skull plate and plaster cast, M + L1 + L2 + K. Fig. 52B,C (p. 113).
UF 177 Skull plates M + L1 + L2 + K. Fig. 52G (p. 113).
UF 178 Skull plates, including D. Fig. 51G (p. 112).
UF 179 Skull plates M + L1 + L2 + K. Fig. 52A (p. 113).
UF 180 Plate D. Fig. 51G (p. 112).
UF 181 Skull plates I and M + L1 + L2 + K. Fig. 52H,M (p. 113).
UF 182 Parasphenoid, cranial rib. Fig. 49D (p. 110).
UF 183 Skull plates, including M + L1 + L2 + K. Fig. 52D,I (p. 113).
UF 184 Skull plate "squamosal". Fig. 52N (p. 113).
UF 185 Skull plate B. Fig. 51D (p. 112).
UF 187 Skull plate D. Fig. 51I (p. 112).

UF 191 Skull plate J. Fig. 52J (p. 113).
UF 195 Jaw. Fig. 50E (p. 111). (Note: As UF 118, error.)
UF 196 Jaw. Fig. 52J (p. 113).
UF 197 Jaw. Fig. 50A (p. 111).
UF 198 Jaw. Fig. 50B (p. 111).
UF 199 Skull plate Y1 + Y2. Fig. 51O (p. 112).
UF 203 Skull plates, including plate B. Fig. 51A (p. 112).
UF 204 Skull and jaw elements including M + L1 + L2 + K. Fig. 50G (p. 111), fig. 52E,K (p. 113).
UF 205 Skull bone Y1 + Y2. Fig. 51N (p. 112).
UF 1668 Tooth. Desc. (p. 107).

Gnathorhiza pusilla (Cope, 1877)
= Originally described as *Ctenodus pusillus* Cope, 1877.
UC 6508 Holotype. Dental plate.
Pennsylvanian: Early Conemaugh, Middle McLeansboro Fm., *Clepsydrops* Shale.
Illinois: Vermilion County: Horseshoe Bend of Vermilion River.
Collector: William F. E. Gurley.
Cope, Edward Drinker. 1877. Descriptions of extinct Vertebrata from the Permian and Triassic formations of the United States. Proceedings of the American Philosophical Society, 17: 182–193. Desc. (pp. 191–192).

Infraclass **ACTINOPTERYGII** Klein, 1885
Superorder **CHONDROSTEI** Müller, 1846
Superorder **CHONDROSTEI,** *Incertae sedis*
Family **ANGUSTIDONTIDAE** Cooper, 1936

Jaws of a shrimp (Dr. William Davey Turnbull, pers. comm.).
= Originally described as the fish *Angustidontus gracilis* Cooper, 1936.
(Note: Specimens now stored in FMNH Fossil Invertebrate Collections according to instructions of the late Dr. Eugene S. Richardson, Jr.)
UC 38100 Holotype for *Angustidontus gracilis* Cooper, 1936. Denticles on "dentary".
Lower Mississippian: Upper Cleveland Shale, black shale.
Ohio: 1 mi SE of Ashmont, about 3 mi S of Lake Erie, Chappel Creek.
Collector: Chalmer L. Cooper, 1932.
Cooper, Chalmer L. 1936. Actinopterygian jaws from the Mississippian black shales of the Mississippi Valley. Journal of Paleontology, 10(2): 92–94. Desc. (p. 93–94) & fig. Pl. 12, Fig. 5.
Paratypes:
UC 38101 Denticles on "dentary". Desc. (p. 94) & fig. Pl. 12, fig. 6.
UC 38106 Denticles on "dentary". Desc. (p. 94) & fig. Pl. 12, fig. 11.

Jaws of a shrimp (Dr. William Davey Turnbull, pers. comm.).
= Originally described as the fish *Angustidontus seriatus* Cooper, 1936.
(Note: Specimens now stored in FMNH Fossil Invertebrate Collections according to instructions of the late Dr. Eugene S. Richardson, Jr.)
UC 38096 Holotype and genoholotype for *Angustidontus gracilis* Cooper, 1936. Denticles on "dentary".
Lower Mississippian: Woodford Fm., dark-gray fissile shales.
Oklahoma: 0.5 mi W of Clarita, Sec. 21, T1S, R8E.
Collector: Chalmer L. Cooper, 1928.
Cooper, Chalmer L. 1936. Actinopterygian jaws from the Mississippian black shales of the Mississippi Valley. Journal of Paleontology, 10(2): 92–94. Desc. (pp. 93–94) & fig. Pl. 12, fig. 1.
Paratypes:
UC 38097 "Dentary" showing terminal cusp, but too poorly preserved to show the smallest denticles. Desc. (p. 94) & fig. Pl. 12, fig. 2.
UC 38098 "Dentary", a crushed specimen showing the terminal cusp and several sizes of denticles. Desc. (p. 94) & fig. Pl. 12, fig. 3.
UC 38099 "Dentary", from inside a siliceous concretion. Desc. (p. 94) & fig. Pl. 12, fig. 4.
UC 38102 "Dentary", a crushed specimen showing clearly the denticles and terminal cusp. Desc. (p. 94) & fig. Pl. 12, fig. 7.
UC 38103 "Dentary" fragment from inside a siliceous concretion. Desc. (p. 94) & fig. Pl. 12, fig. 8.
UC 38104 "Dentary" fragment from inside a siliceous concretion with cast of pulp cavity. Desc. (p. 94) & fig. Pl. 12, fig. 9.
UC 38105 "Dentary" with denticles from inside a siliceous concretion. Desc. (p. 94) & fig. Pl. 12, fig. 10.

Order **PALAEONISCIFORMES** Goodrich, 1909
Suborder **PALAEONISCOIDEI**
?Family **RHABDOLEPIDAE** Gardiner, 1963

Grandfieldia callilepidota Daly, 1973
UF 1059 (formerly PF 2658) Holotype. Partial skull with shoulder girdle and pectoral fins attacked.
Lower Permian: Arroyo Fm., believed Arroyo equivalent.
Oklahoma: Tillman County: Near Granfield, SW¼, SE¼, SE¼, Sec. 20, T4S, R51W.
Collector: Mr. Orville Gilpin, 1966.
Daly, Eleanor. 1973. A Lower Permian vertebrate fauna from southern Oklahoma. Journal of Paleontology, 47(3): 562–589. Desc. (pp. 564–567) & fig. Figs. 1, 2 (p. 565), fig. 3 (p. 566).
Paratypes:
UF 1056 Fragmentary skull. Desc. (p. 564).
UF 1060 (formerly PF 2659) Lower jaw with branchiostegal rays and part of shoulder girdle. Desc. (pp. 564–565).
UF 1061 (formerly PF 2660) Lower jaw with branchiostegal rays and part of shoulder girdle. Desc. (pp. 564–565).
UF 1062 (formerly PF 2661) Lower jaw with branchiostegal rays. Desc. (p. 564).
UF 1063 (formerly PF 2662) Portion of body. Desc. (pp. 564, 566).
UF 1064 (formerly PF 2663) Scales. Desc. (p. 564).

Family **ELONICHTHYIDAE** Aldinger, 1937

Elonichthys remotus Schultze & Bardack, 1987
PF 7495 Holotype. Whole fish.
Middle Pennslvanian: Westphalian D, Carbondale Fm., Francis Creek shale.
Illinois: Will or Kankakee County: Peabody Coal Company, Pit 11.
Schultze, Hans-Peter, and David Bardack. 1987. Diversity and size changes in palaeonisciform fishes (Actinopterygii, Pisces) from the Pennsylvanian Mazon Creek fauna, Illinois, U.S.A. Journal of Vertebrate Paleontology, 7(1): 1–23. Desc. (pp. 11–12, 16) and fig. Figs. 10A,B (p. 13), fig. 11D (p. 13).

Elonichthys wolffi Schultze & Bardack, 1987
PF 7340 Holotype. Whole fish.
Middle Pennsylvanian: Westphalian D, Carbondale Fm., Francis Creek Shale.
Illinois: Will or Kankakee County: Peabody Coal Company, Pit 11.
Collectors: Francis and Terri Wolff (Wolff No. 602).
Schultze, Hans-Peter, and David Bardack. 1987. Diversity and size changes in palaeonisciform fishes (Actinopterygii, Pisces) from the Pennsylvanian Mazon Creek fauna, Illinois, U.S.A. Journal of Vertebrate Paleontology, 7(1): 1–23. Desc. (pp. 10–11, 15–16) and fig. Figs. 9A,B (p. 12), fig. 11C (p. 13), fig. 12D (p. 14).
Paratypes:
UF 7226 Part and counterpart. Desc. (p. 11).
UF 7517 Part and counterpart. Desc. (p. 11).
UF 9073 Part and counterpart. Desc. (p. 11).

Illiniichthys cozarti Schultze & Bardack, 1987
UC 21716 Holotype. Whole fish.
Middle Pennsylvanian: Westphalian D, Carbondale Fm., Francis Creek Shale.
Illinois: Will County: Braidwood.
Collectors: Francis and Terri Wolff (Wolff No. 602).
Schultze, Hans-Peter, and David Bardack. 1987. Diversity and size changes in palaeonisciform fishes (Actinopterygii, Pisces) from the Pennsylvanian Mazon Creek fauna, Illinois, U.S.A. Journal of Vertebrate Paleontology, 7(1): 1–23. Desc. (pp. 6, 16–17) and fig. Fig. 2A,B (p. 3), fig. 3A (p. 6).
Paratypes:
UF 162 Part and counterpart. Desc. (p. 6).
UF 592 Part and counterpart. Desc. (p. 6).
PF 4902 Part and counterpart. Desc. (p. 6).
UF 9060 Part and counterpart. Desc. (p. 6).

Family **PLATYSOMIDAE** Young, 1866

Platysomus circularis Newberry & Worthen, 1870
UF 593 (formerly UC 14390) Counterpart to holotype. Holotype is UI X-489 at the University of Illinois, Urbana. Nearly complete individual.
Middle Pennsylvanian: Westphalian D, Carbondale Fm., Francis Creek Shale.
Illinois: Grundy County: Mazon Creek.
Collector: William F. E. Gurley.
Newberry, John Strong, and Amos H. Worthen. 1870. Description of fossil vertebrates.

Geological Survey of Illinois, 4: 347–374. Desc. (p. 347) & fig. Pl. 4, fig. 2.

Platysomus lacovianus Cope, 1891
PF 8122 Cast of holotype. Original at the American Museum of Natural History, AMNH 7400. Rubber mold of ½ of one concretion. Complete fish.
Middle Pennsylvanian: Westphalian C, Carbondale Fm., Francis Creek Shale.
Illinois: Grundy County: Mazon Creek.
Cope, Edward Drinker. 1891. On the characters of some paleozoic fishes. I. On a new elasmobranch from the Permian; *Styptobasis knightiana* gen. et spec. nov. II. On new ichthyodorulites; *Hybodus regularis,* sp. nov., *Ctenacanthus amblyxiphias,* sp. nov. III. On the cranial structure of *Macropetalichthys.* IV. On the pectoral limb of the genus *Holonema,* Newb. V. On the paired fins of *Megalichthys nitidus,* Cope. VI. On the nonactinopterygian Teleostomi. VII. On new species of Platysomidae, *Platysomus palmaris* and *P. lacovianus.* Proceedings of the U.S. National Museum, 19: 447–463. Desc. (p. 462) & fig. Pl. 31, fig. 11.

Order **ACIPENSERIFORMES** Goodrich, 1909
Family **ACIPENSERIDAE** Bonaparte, 1832
Subfamily **PROPENSERINAE**

Propenser hewletti Applegate, 1970
PF 288 Paratype. One plate, probably from the holotype specimen.
Late Cretaceous: Selma Group, Upper Mooreville Fm.
Alabama: Greene County: Hewlett's Farm, gullies near road.
Applegate, Shelton P. 1970. The vertebrate fauna of the Selma Formation of Alabama. Part VIII. The fishes. Fieldiana: Geology Memoirs, 3(8): 365–433. Desc. (p. 399).

Superorder **HOLOSTEI**
Order **PYCNODONTIFORMES**
Family **GYRODONTIDAE**

Anomoeodus barberi Hussakof, 1947
P 27078 Holotype. Palatal fragment with teeth.
Late Cretaceous: Marlbrook Marl, Gulf Series.
Arkansas: Clark County: Cox Farm, 2 mi NE of Oklahoma.
Collector: Charles M. Barber.
Hussakof, Louis 1947. A new pycnodont fish from the Cretaceous of Arkansas. Fieldiana: Geology, 10(4): 23–27. Desc. (pp. 24, 26) & fig. Fig. 9 (p. 25).
Paratype:
P 27079 Right mandibular with the dentition less complete than in the type. Desc. (pp. 24, 26) & fig. Fig. 9 (p. 25).

Order **AMIIFORMES** Huxley, 1861
Family **AMIIDAE** Bonaparte, 1832

Amia fragosa (Jordan, 1927)
= Originally described as *Paramiatus gurleyi* Romer & Fryxell, 1928.
UC 2201 Holotype for *Paramiatus gurleyi* Romer & Fryxell, 1928. Skeleton.
Middle Eocene: Green River Fm.
Wyoming: Lincoln County: Fossil.
Collector: William F. E. Gurley, 1882.
Romer, Alfred Sherwood, and F. M. Fryxell. 1928. *Paramiatus gurleyi,* a deep-bodied amiid fish from the Eocene of Wyoming. American Journal of Science, 16(5): 519–527. Desc. (pp. 519–527) & fig. Fig. 1 (p. 520), fig. 2 (p. 522), fig. 3 (p. 524).

Superorder **OSTEOGLOSSOMORPHA** Greenwood, Rosen, Weitzman & Myers, 1966
Order **OSTEOGLOSSIFORMES** Regan, 1909
Suborder **NOTOPTEROIDEI** Jordan, 1923
Superfamily **HIODONTOIDEA** Valenciennes, 1846
Family **HIODONTIDAE** Valenciennes, 1846

Eohiodon woodruffi Wilson, 1978
= Originally described as *Eohiodon falcatus* Grande, 1979.
PF 10424 (formerly UMVP 6499, University of Minnesota, Vertebrate Paleontology Collections) Holotype. Whole fish.
Early Eocene: Green River Fm., Fossil Butte Member.
Wyoming: Lincoln County: About 16 km NW of Kemmerer, Thompson Ranch, Tynsky Quarry, NW¼, SW¼, Sec. 22, T22N, R117W.
Collector: Lance Grande, 1977.
Grande, Lance. 1979. *Eohiodon falcatus,* a new species of hiodontid (Pisces) from the Late Early Eocene Green River Formation of

Wyoming. Journal of Paleontology, 53(1): 103–111. Desc. (pp. 103–111) & fig. Fig. 1 (p. 104).

Superorder **ELOPOMORPHA** Greenwood, Rosen, Weitzman & Myers, 1966
Order **ELOPIFORMES** Greenwood, Rosen, Weitzman & Myers, 1966
Family **APSOPELICIDAE**

Apsopelix latifrons (Cope, 1875)
= Originally described as *Syllaemus latifrons* Cope, 1875.
PF 3496 Cast of holotype for *Syllaemus latifrons* Cope, 1875. Cast of whole fish.
Late Cretaceous.
U.S.A.: New Mexico (?).
Cope, Edward Drinker. 1875. The Vertebrata of the Cretaceous formations of the West. Report of the U.S. Geological Survey of the Territories, Washington, D.C. 2: 1–303. Desc. (pp. 180–182, 273).

Family **ELOPIDAE** Bonaparte, 1846

Palelops eutawensis Applegate, 1970
PF 3559 Holotype. Scale.
Late Cretaceous: Selma Group, Lower Mooreville Fm.,
Alabama: Eutaw County: 6.2 mi W of Aliceville, 0.25 mi E of Walter Dance's Farm.
Collector: Shelton P. Applegate, 1958.
Applegate, Shelton P. 1970. The vertebrate fauna of the Selma Formation of Alabama. Part VIII. The fishes. Fieldiana: Geology Memoirs, 3(8): 365–433. Desc. (p. 406) & fig. Fig. 188A (p. 405).
Paratypes:
PF 3560 Scales. Desc. (p. 406) & fig. Fig. 188B (p. 405).
PF 3561 Scale. Desc. (p. 406).
PF 3563 Scale. Desc. (p. 406).
PF 3612 Scales. Desc. (p. 406).

Family **ALBULIDAE** Bleeker, 1859

Albula dunklei Applegate, 1970
P 27494 Holotype. Complete skeleton with scales in tail.
Late Cretaceous: Selma Group, Mooreville Fm.
Alabama: Dallas County: Moore Ranch, 1 mi SW of Archelon site.
Collector: Rainer Zangerl, May 12, 1946.
Applegate, Shelton P. 1970. The vertebrate fauna of the Selma Formation of Alabama. Part VIII. The fishes. Fieldiana: Geology Memoirs, 3(8): 365–433. Desc. (pp. 412–413) & fig. Fig. 194A (p. 412), fig. 200B,C (p. 418).
Paratypes:
PF 3564 Scales and vertebrae. Desc. (p. 412).
PF 3580 Scale. Desc. (p. 412).

Family **BANANOGMIIDAE**

Bananogmius crieleyi Applegate, 1970
PF 3608 Holotype. Premaxillary, basihyal, parasphenoid, vomer, 5 vertebrae.
Late Cretaceous: Selma Group, Mooreville Fm.
Alabama: Dallas County: Moore Farm, high river exposure.
Collector: Rainer Zangerl, 1946.
Applegate, Shelton P. 1970. The vertebrate fauna of the Selma Formation of Alabama. Part VIII. The fishes. Fieldiana: Geology Memoirs, 3(8): 365–433. Desc. (pp. 414, 416) & fig. Fig. 196A–G (p. 414), fig. 200D (p. 418).

Moorevillia hardi Applegate, 1970
PF 3567 Holotype. Disarticulated skull, fin rays, vertebrae.
Late Cretaceous: Selma Group, Mooreville Fm.
Alabama: Dallas County: Moore Farm, SPA Locality 14.
Collector: Shelton P. Applegate, 1958.
Applegate, Shelton P. 1970. The vertebrate fauna of the Selma Formation of Alabama. Part VIII. The fishes. Fieldiana: Geology Memoirs, 3(8): 365–433. Desc. (p. 416) & fig. Fig. 197A–U (p. 415).

Superorder **CLUPEOMORPHA** Greenwood, Rosen, Weitzman & Myers, 1966
Order **?ISOSPONDYLI**
Suborder **?CLUPEOIDEI** Bleeker, 1859
Family **OSTARIOSTOMIDAE**

Ostariostoma wilseyi Schaeffer, 1949
PF 10279 Cast of holotype. Original at Princeton University Geological Museum, No. 14728. Peel of whole fish.

Upper Cretaceous or Lower Paleocene: Livingston Fm., fresh-water varved shales.
Montana: Madison County: Raw Liver Creek (? trib. Indian Creek), Sec. 17, T8S, R3E.
Collector: James A. Wilsey, 1947.
Schaeffer, Bobb. 1949. A Teleost from the Livingston Formation of Montana. American Museum Novitates, No. 1427: 1–16. Desc. (pp. 3–15) & fig. Fig. 1A,B (p. 5), fig. 2A,B (p. 9).

Superorder **OSTARIOPHYSI** (*sensu* Fink and Fink, 1981)
Order **CYPRINIFORMES** Bleeker, 1859
Family **CATOSTOMIDAE** Gill, 1861

Amyzon aggregatum Wilson, 1979
= Originally described as *Amyzon gosiutensis* Grande, Eastman & Cavender, 1982
Holotype for *Amyzon gosiutensis* Grande, Eastman & Cavender, 1982 at University of Wyoming, Laramie, UW 11578.
Middle Eocene: Green River Fm., Laney Shale Member.
Wyoming: Lincoln County: Outcrop along Fontenelle Reservoir, near La Barge, Sec. 11, T42N, R112W.
Collectors: Paul Buchheim of Loma Linda Univ., and James Rogers, formerly of La Barge, Wyoming.
Grande, Lance, Joseph T. Eastman, and Ted M. Cavender. 1982. *Amyzon gosiutensis,* a new catostomid fish from the Green River Formation. Copeia 1982(3): 523–532.
Paratypes for *Amyzon gosiutensis* Grande, Eastman & Cavender, 1982:
PF 10425 (formerly University of Minnesota Vertebrate Paleontology Collections number UMVP 6500, not designated as a paratype but used in formal description in original paper and cited in original paper) Whole fish. Desc. (pp. 524, 528–530) & fig. Fig. 3 (p. 530).
PF 10426 (formerly UMVP 6501) Whole fish except posterior ventral half. Desc. (p. 524).
PF 10427 (formerly UMVP 6502) Whole fish. Desc. (pp. 524, 527–528).
PF 10428 (formerly UMVP 6504) Anterior half of fish. Desc. (p. 524).
PF 10429 (formerly UMVP 6505) Anterior half of fish. Desc. (pp. 524, 526).
PF 10430 (formerly UMVP 6506) Anterior half of fish. Desc. (pp. 524, 528).
PF 10431 (formerly University of Minnesota Vertebrate Paleontology Collections number UMVP 6507, not designated as a paratype but used in formal description in original paper and cited in original paper) Posterior half of fish. Desc. (p. 542) & fig. Fig. 7 (p. 530).

Note: *Amyzon gosiutensis* is a junior synonym of *A. aggregatum* Wilson, 1979; see Bruner (1991). For documentation of transfer of specimens from the University of Minnesota, see Grande (1991).

Order **SILURIFORMES** Cuvier, 1817
Family **HYPSIDORIDAE** Grande, 1987

Hypsidoris farsonensis Lundberg & Case, 1970
PF 10453 Cast and peel of holotype, PU 20570, at the Peabody Museum of Natural History. Part and counterpart of nearly complete fish.
Early Middle Eocene: Green River Fm., Laney Member.
U.S.A.: Wyoming: Sweetwater County: 3 mi E of Big Sandy Reservoir, near Farson, T27N, R105W.
Lundberg, John G., and Gerard R. Case. 1970. A new catfish from the Eocene Green River Formation. Journal of Paleontology, 44(3): 451–457. Desc. (pp. 451–455) and fig. Pl. 81, figs. 1, 2; pl. 82, fig. 1 (p. 453), fig. 2 (p. 454).
PF 10684 Cast and two peels of paratype, AMNH 6888, at the American Museum of Natural History. Whole fish. Desc. (pp. 452–453).

Superorder **PARACANTHOPTERYGII** Greenwood, Rosen, Weitzman & Myers, 1966
Unranked Subgroup **ANACANTHINI** (*sensu* Rosen & Patterson, 1989)
Family **McCONICHTHYIDAE** Grande, 1988

McConichthys longipinnis Grande, 1988
PF 12916 Holotype. A nearly complete fish with portions of skull prepared on both sides.
Lower Paleocene: Tullock Fm., Fort Union Group.
Montana: McCone County: Along a tributary of Rock Creek, 0.25 mi W of Bonin schoolhouse, about 24 mi SE of Fort Peck, Montana, SE¼, Sec. 36, T23N, R43E.
Grande, Lance. 1988. A well preserved paracanthopterygian fish (Teleostei) from freshwater Lower Paleocene deposits of

Montana. Journal of Vertebrate Paleontology, 8(2): 117–130. Desc. (pp. 119–127) & fig. Fig. 1 (p. 120), fig. 2 (p. 122), fig. 3 (p. 123), fig. 4 (p. 124), fig. 5 (p. 125), fig. 6 (p. 126).

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